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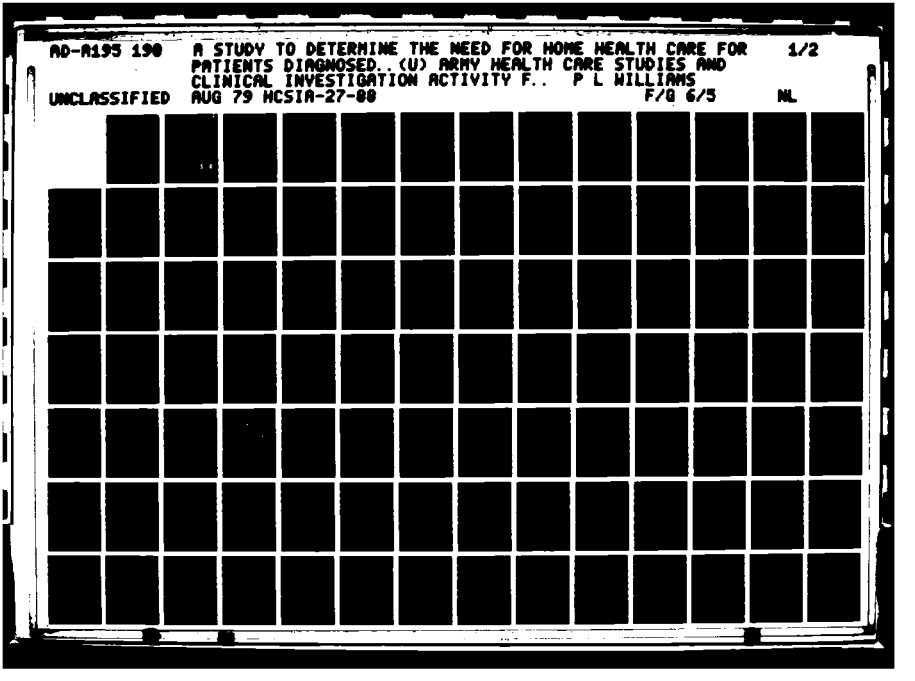

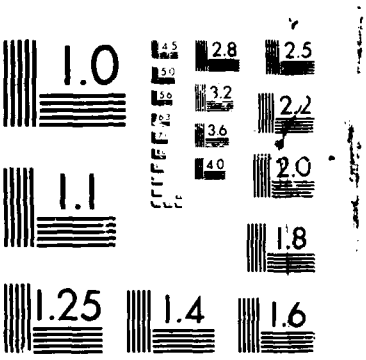

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A Problem Solving Research Project

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Requirements for the Degree

of

Master of Health Administration

by

Lt Colonel Patricia L. Williams, USAF, NC

August 1979

TABLE OF CONTENTS

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LIST OF TABLES

LIST OF ILLUSTRATIONS

CHAPTER I.

INTRODUCTION

The Genesis of the Study

An increase in the number of people with chronic medical conditions who seek care from the health care industry has occurred during the past few years. There are eligible people who turn to the Air Force Medical Service (AFMS) for assistance with chronic medical conditions. Increasingly, these patients have health and social problems and difficulty accomplishing their activities of daily living. As a response to the needs of these patients, the AFMS offers inpatient and outpatient care. Unfortunately, the AFMS is oriented toward inpatient and outpatient care as a discrete, acute illness modality. There appears to be a schism where acute care is offered and chronic care is required. By chronic care is meant a flexible mix of health and social services that allows the patient to function independently in his/her activities of daily living. This flexible mix lies beyond the alternatives of hospitalization and outpatient care. It can be called Home Health Care. There is no formal Home Health Care Program in the AFMS.

It is the purpose of this problem-solving project to determine whether there is a need for Home Health Care as a component of the services now provided in the AFMS facility. There are numerous chronic medical conditions among patients eligible for care from the AFMS. In

this paper, the adult patient with a diagnosis of Diabetes Mellitus will serve as a representative of chronic medical conditions.

The need for Home Health Care among patients diagnosed with Diabetes Mellitus can be used as a tracer for the needs of patients with chronic medical conditions.[1] Diabetes Mellitus meets established criteria as a tracer disease for chronic medical conditions because it is prevalent in the population, transcends age groupings, is a discrete diagnostic category, has a predictable outcome, and the treatment is preventive and remedial.[2] Diabetes Mellitus as a tracer, performs as an indicator of all chronic medical conditions. The underlying assumption is that the need for home care among these patients is indicative of the overall need for home care among patients with chronic medical conditions.[3]

Statement of the Problem

The problem is to determine whether a need exists for a Home Health Care Service (HHCS) in the AFMS for patients with a diagnosis of Diabetes. The problem parameters involve several areas within the present AFMS. These parameters are disabilities, diabetic management at home, access to the physician, and family support in the home. Further, the problem is to determine whether a relationship exists between Diabetes and Home Health Care need because of disability, home management, physician access, and family support. Stated another way, the question is asked, were it not for these parameters would Diabetes and Home Health Care be related?[4]

To determine whether a need exists, there must first be a relationship established between Diabetes and HHCS. The other parameters demonstrate the causal relationship between Diabetes and the need for HHCS. The causal relationships defined in a Diabetic population must demonstrate

an unmet need for HHCS. The parameters become test variables. (Figure 1)

The presence or absence of need for Home Health Care (HHC) is reliant upon a demonstration of causal relationships. Patients who are completely functional, manage well at home, have access to the physician, and have family support at home demonstrate a low probability of need for HHC. There would be no relationship between these Diabetics and the need for HHCS. Patients who fail to pass the test for functional ability, home management, physician access, and/or family support demonstrate a high probability of need for HHC. These probabilities must be demonstrated to determine a need for HHCS.

Limitations

The limitations of conducting this study are the experimental design, and service area identification.

This study is limited because, in part, the design is experimental. There is no Home Health Care Program in the Air Force. Therefore, there is no comparable standard against which to measure users of Air Force Home Health Service. Although some rough comparisons can be made with U.S. Army Home Health Care Programs, the caseload data is incomplete because of the experimental nature of the programs.[5]

It was necessary in this experimental design to develop a model to evaluate the need for Home Health Care. This requirement limits the study because the validation of the model competes with the main thrust of the study; determination of need.

The regional concept where patients come from all over the world is a unique characteristic of this medical center. Because Diabetics

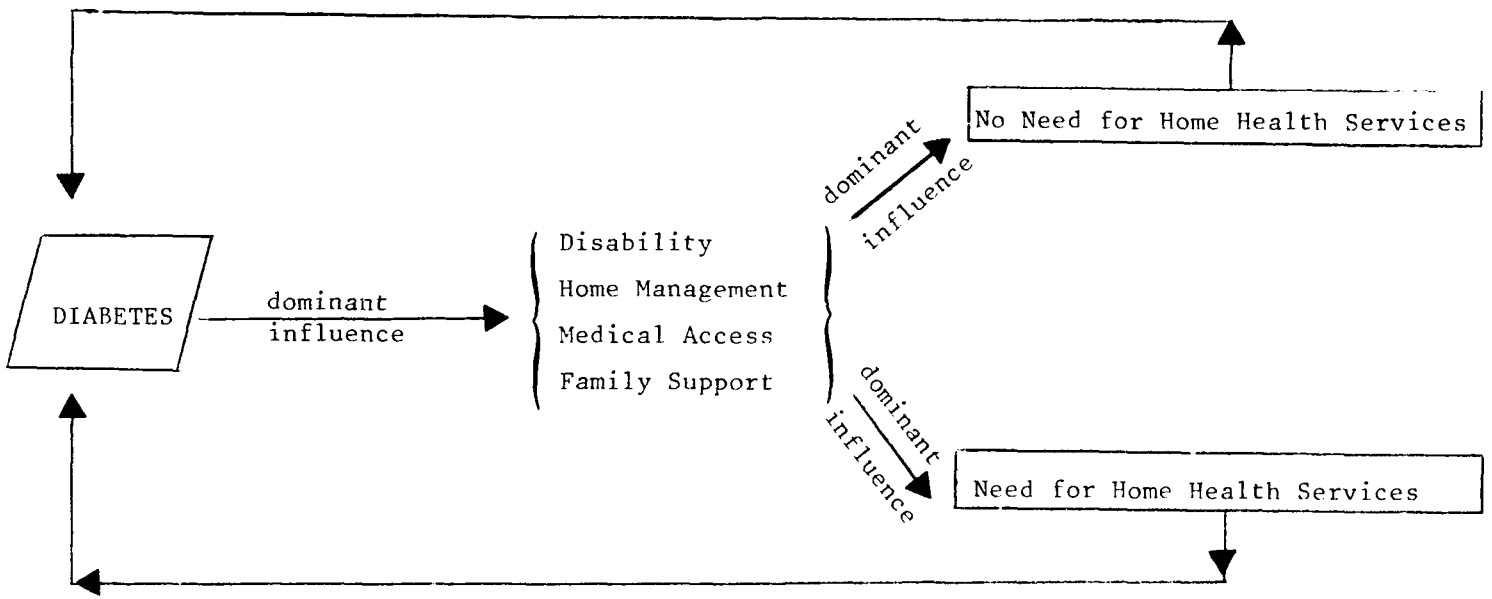


Figure 1: A model for demonstrating the need for Home Health Care Services for Diabetics

come from neighboring states and distant locations within the state, it was necessary to apply some boundary to the hypothetical Home Health Care service area. This boundary also assisted in the development of a fixed sample. A fifteen mile radius was the original boundary and this radius was decreased to ten miles because of excessive travel requirements for a fifteen mile radius. In good weather, the travel time for 10 miles is 35 to 45 minutes and in bad weather, this time can double or triple.[6] It should be noted that any boundary would be elastic in actual operation. For the purpose of study, a firm boundary assists in identifying a fixed population, but does not include all of the potential HHCS patients who may reside outside the boundary.

Definitions

Home Health Care (HHC) Multidisciplinary supportive care provided in the patient's place of residence on an episodic basis. The supportive care is preventive and therapeutic; it includes patient education, treatment of the patient, and rehabilitation or maintenance of optimal function of the patient.

Home Health Care Program (HHCP) An organized response directed toward satisfying a community health need or resolving a community health problem.[7]

Self Care The ability to carry out the daily living activities related to one's body, mind, and welfare.[8]

Home Health Care Service (HHCS) A range of health care rendered to patients in their place of residence through a Home Health Care Program.

Chronic Medical Condition A medically attended long-term state; described primarily as a departure from physical well-being although, social and mental departures from well-being usually accompany the condition.

Home Health Care Need Need in this context, is a component of demand. The demand envisioned is a combination of want and physical or social requirements (need) with four permutations. These permutations are derived by adding the provider and the patient to the two aspects of demand. The following demand situation results:

Home Health Care Service Demand

Provider:	want	require	require	want
Patient:	require	want	require	want

This situation reveals that the demand components of the provider and the patient may be the same or different and these permutations impact on demand. These demand components may overlap in almost any configuration to determine the degree of demand.[9]

Effective demand depends upon the availability of a service. Because an HHCS is not now available, this kind of demand that exists only when an HHCS is available cannot be measured. Instead the physical and social requirements were measured in this study as a component of potential demand.

Disability Any reduction of a person's physical activity as a result of a medical condition.[10]

Family Support The presence of adult family members in the place of residence and the family assists the patient with the activities of daily living when needed.

Diabetic Management The patient's effective use of resources to maintain or improve his/her health in the place of residence. These resources include the physician and other health workers, self care, family, diet, exercise, and urine testing.

Medical Access The patient's ability to achieve a patient-physician encounter. Obstacles to this patient-physician encounter include appointment systems, communication channels, interval between visits, and reliability of transportation.

FOOTNOTES

[1]Gregory I. Schorr and Paul A. Nutting. "A Population-based Assessment of the Continuity of Ambulatory Care." Medical Care 15 (June 1977): 455.

[2]Schorr, p. 456; David M. Kessner, Carolyn E. Kalk, and James Singer. "Assessing Health Quality--The Case for Tracers." The New England Journal of Medicine. 288 (January 25, 1973): 190.

[3]Schorr, p. 455

[4]Morris Rosenberg. The Logic of Survey Analysis (New York: Basic Books, 1968): 24.

[5]Interview with Capt. Finnegan, Community Nursing Service, Brooke Army Medical Center, San Antonio, Texas, October 18, 1978.

[6]Interview with MSGT Jackson, Emergency Medical Services, November 6, 1978.

[7]Administrator's Handbook for the Structure, Operation, and Expansion of Home Health Agencies. NLN Publication 21-1653 (1977): 18.

[8]Katharine P. Thomas. "Diabetes Mellitus in Elderly Persons." Nursing Clinics of North America 11 (March 1976): 163.

[9]Methods for Determining and Projecting Needs and Demands for Long-Term Care and Home Health Services. Thomas F. Lantry, Project Director. (Washington, D.C.: Arthur Young and Company, 1975): 4.

[10]Limitation of Activity Due to Chronic Conditions, 1974. (National Center for Health Statistics: Rockville, Maryland, June 1977) p. 59.

CHAPTER II.

LITERATURE REVIEW

History of Home Health Care

It seems appropriate to begin a summary of HHC literature with a brief history of the progress of this health care delivery system. Coordinated HHC began in this country as a model of the HHCS at Montefiore Hospital in New York in 1946. This HHCS was a post-acute home care program.[1] Prior to this model, there have been small organized services in the United States, to care for the sick at home since 1877. The monumental change in the complexion of HHCS came with the passage of PL 89-97, Medicare and Medicaid. This reimbursement method for HHCS was short-lived and by 1967, restrictions on the type of service to be reimbursed in the home began to appear. By 1969, skilled nursing care was required for reimbursement. "Skill" had nothing to do with competence but rather effectively limited reimbursement to technical procedures which could be accomplished by a professional health worker (i.e. insertion of a catheter).[2] This restriction resulted in loss of reimbursement for a majority of patients who needed, rather than technical procedures, continued medical professional and home health aide support in the home.[3] In a California study of in-home services, Katherine Ricker-Smith demonstrated a dramatic decrease in home visits between 1969-1973 after a like increase between 1966-1969.[4] The 1969 restriction on HHCS reimbursement tended to force the chronically

ill and disabled into acute care settings and the restriction indicated lack of understanding of the needs of the chronically ill.[5] Diabetic patients were among the chronically ill who received the greatest cut in reimbursement.[6]

The 1969 restriction for in-home service reimbursement has slowed the growth of HHCS in the United States. Lack of third party reimbursement makes HHCS cost prohibitive for most people and further, because of the slowed growth of HHC services, there are generally few available HHC services in a given community.[7] In the two counties immediately surrounding Wright-Patterson AFB, there are only three full service HHC agencies.[8] These agencies are free-standing Community resources and two of them are county health departments.

The Hospital Based Home Health Care Service

More recently, there has been a slight increase in the number of hospital-based HHCS agencies.[9] In 1969, eight percent of all HHC services were hospital-based and by 1973, this percentage had increased to 10.4 percent.[10] The primary advantage of hospital-based vis-a-vis community based HHCS is the continuity of care gained in a hospital setting. The HHC staff can become thoroughly acquainted with the patient and/or family before hospital discharge. Further, hospital HHCS agencies can usually provide a wider range of services to the patient. As of 1973, only 6 percent of the HHC services in the United States had a full range of services; nursing, physical therapy, occupational therapy, speech therapy, and medical social work. Eighteen percent of these HHC services were hospital-based agencies.[11]

Another characteristic of a hospital-based HHCS agency is a reasonably defined service area. When the hospital serves a large catchment

area, the HHCS serves best as a coordinating agency with other HHCS services in the community.[12] A rationale for defining a service area is to improve the efficiency of the HHCS by decreasing travel time. In a descriptive article about a Veteran's Administration HHCS, Dr. Paul Haber reported that the service area was confined to patients residing within 30 miles or 35 minutes of the hospital.[13] The Brooke Army Medical Center HHCS is confined to a fifteen mile perimeter. This boundary is flexible and is expanded where a need exists.[14]

A Federal Home Health Care Service

The private sector hospital-based HHCS is a close approximation to an HHCS in the federal sector. This similarity exists because each of these agencies operates as part of a single larger agency; which treats both inpatients and outpatients. The larger organization in the private sector is the hospital and in the federal sector, the appropriate Medical Service.

A federal sector HHCP was started in August of 1978 as an experimental project at Brooke Army Medical Center (BAMC) in San Antonio, Texas. Because the manpower for this HHCS is not separate from the Army Health Services, the HHCS is provided as a component of other health services (i.e. immunizations, communicable disease control). The primary program objectives are coordinative referrals to civilian HHCS for discharged hospital patients and initial home assessments. It is interesting to note that a nucleus of patients has evolved and these patients are provided HHCS by the staff at BAMC. This group of patients could not be referred to a civilian HHCS for various reasons; usually the obstacle was cost. The patients were not eligible for Medicare or Medicaid;

CHAMPUS would not reimburse for HHC because skilled nursing care was not performed; and the patients were unable to pay for the cost of HHC. This nucleus of patients--this caseload--numbered twenty-five in October of 1978.[15] The point to be made here is that this caseload was not anticipated and was identified only after establishing an HHCP. It is suspected that this unique group may exist at other federal medical facilities and, perhaps, comprises a frequently hospitalized group. It appears, however, that the identification of such a group would not be revealed in a determination of need study. Although, in the final analysis, it is this nucleus of patients who have the most need for a federal HHCS.

Determination of Need Studies

The determination of need studies accomplished to date have not devised precise and exacting distillation of data. A majority of the studies have used current utilization rates of HHC Services as a standard to estimate need in given populations.[16] Unfortunately, these studies have looked at data only for persons age 65 and over because most of the HHC patients are in that age group.

This limitation makes it difficult to compare the data to other populations. As a result, the estimates of need are usually qualified by the age of the population. The results of these studies can be used as a point estimate of need in a community where no HHCS exists.

During this review, a study was found which developed samples from currently hospitalized patients.[17] This study incorporated determination of need methodologies developed in two previous studies.[18] Two major parameters were considered in this study at a medical center in

Indiana. These parameters were a clinical appraisal of need based on disability and willingness of the family to provide care in the home. The disability algorithm included the following elements: (1) Mobility, (2) Continence, (3) Need for rehabilitative services (Physical Therapy), (4) Mental State (agitation, confusion, coma), and (5) Need for special procedures or equipment.[19] The disability and family support data was collected by nursing personnel for every patient and the disability algorithm was measured against preset criteria. These dichotomous criteria were low probability and high probability. Low probability for HHC need was calculated for patients with no disability and patients with one or more disabilities were assigned a high probability of need for HHC. Those patients without family willingness were subtracted from the high probability of need group. The resulting sum represented the estimation of need for HHCS and the proportion was 5.2 percent.[20]

In two studies, the sample was derived from discharged hospital patients at home. Each study examined a different aspect of the need for HHCS among post-discharge patients. A study, published by Gerald M. Eggert et al, was accomplished at Brandeis University.[21] The study was longitudinal and the methodology included functional assessments of hospitalized patients at admission and discharge. Depending upon the disposition of the patient, nursing home or place of residence, two major groups were formulated. The group of patients who returned home were further divided into two groups; those receiving HHCS and those not receiving HHCS. The latter two groups were measured against the family willingness to provide home care.[22] It was found that the family willingness to provide home care was dependent upon the number of hospitalizations. The larger the number of hospitalizations, the less

willing was the family to provide home care--except where HHCS was available.[23] The implication, not entirely proven in this study, was that HHCS bolstered the family resilience in home care.[24]

Diabetic Home Care

A second study targeted diabetic out-patients. The purpose of this study, at two university medical centers, was to determine relationships between knowledge, home management, and Diabetic control.[25] Sixty patients were visited in the home and evaluated for appropriate urine testing, injections, foot care, medication dosage, meal preparation, and disease control. Approximately half of the patients demonstrated poor management in all of the areas tested, and with increasing knowledge of diabetes, patient management improved.[26] This high correlation did not exist between disease control of diabetics and management or knowledge. In fact, knowledge and good management occurred along with poor control.[27] The study concluded that medical support in the home might improve overall management and control.[28]

The criteria for diabetic control in the above study, was reported separately by T. Franklin Williams.[29] The methodology for the control criteria sets was to establish minimum levels for weight, blood sugars, urine testing, and insulin reactions. Dependent upon the patient's compliance with these levels, he/she was catagorized as good, fair, poor, or very poor control. A score was assigned to each criterion and the sum of these scores matched the sum of possible scores for a category.[30]

The Use of Criteria in Determination of Need Studies

A landmark methodology in the HHC studies is the use of criteria against which a population is measured. It is not that the use of criteria is unique to the determination of need for HHCS. Rather, there is no other way to estimate need at this time. Developing criteria for this particular need is damnably difficult because the variables are numerous, often interdependent, and frequently elusive. An inherent danger exists with the establishment of formal criteria and that is the risk of locking people into a rigid category. One good rule to follow is to make the criteria as pragmatic and flexible as possible.[31] The use of flexible, pragmatic criteria in combination with a patient survey allows the addition of unique elements of a patient's assessment to a professionally defined need.[32]

Disabilities and Home Health Care

A study by Martini and McDowell showed high correlation between patient and physician judgments of functional ability. The correlations were highest for physical function and lowest for social function.[33] This result is not surprising because physicians would not be expected to know as well as the patient how physical impairments influence each person in all the activities of daily living. The implication from this study, is that the patient can accurately relate his/her degree of physical function to a surveyor.

The physical dysfunction associated with Diabetes comprises two major areas of disability; mobility and visual impairment. The genesis of this dysfunction is the propensity for vascular and nerve disease. Vascular disease is manifested by large and small vessel disease.

Large vessel disease leads to cardiac disease and peripheral vascular disease while small vessel disease leads to occular problems such as cataract, retinopathy, and glaucoma. Retinopathy is the leading case of blindness in diabetics.[34] The combination of vascular and nerve disease, neuropathy, results in numbness and absence of reflexes in the extremities. Peripheral involvement means that diabetics are particularly susceptible to lesions and injuries of the feet and legs.[35] Frequently, the diabetics with this complication have compromised mobility and amputation of the extremity is often the ultimate successful treatment.

Activity restriction as a result of disability and/or a function of disease chronicity has been documented for diabetes. The National Health Survey in 1974, revealed that of 1427 diabetics, 63 percent were limited in major activity.[36] Major activity in this context, is the ability to work or keep house.[37] Activity restriction was used as a disability measure for the elderly population with chronic disease in a HHC study in Rhode Island.[38] Activity restriction in that study was measured for a two week recall period. The number of days confined to bed and the days of restriction because of not feeling well were recorded. Activity restriction, in the Rhode Island study, exemplified the inability to care for oneself.[39] Activity restriction as an overall concept, includes major activity limitation and limitations in the activities of daily living. It is suspected that the degree of disability has an influence upon the patient's ability to manage at home and the ability to obtain access to a medical facility.

The Medical Access Factor

Medical access is a difficult element to assess without the patient's input. Although utilization rates can be charted by the health care delivery system, there comes a point when the patient must be asked to adjudge his/her access to the system. In a statement about ambulatory care, J. H. Mernaghan identified three definable areas of ambulatory care appraisal. These areas are accessibility and availability of entry into the system, quality of care while in the system, and satisfaction, compliance, and acceptance of service upon exit from the system.[40] It is availability of appointment times, waiting times, and nuance of satisfaction with these factors that comprise the patient's evaluation of access to a health care delivery system. For this spectrum of need, accessibility, it is suspected that the patient's point of view is the best indicator available.

For the disabled or older person, another barrier exists when transportation is unreliable for physical or economic reasons.[41] This type of barrier has been described as geographic inaccessibility or "friction of space".[42] Ian Lawson, in an eloquent appeal for HHCS for the elderly, identifies the transportation barrier as yet another justification for HHCS.[43] It is suspected that inadequate medical access is a determination of need parameter for HHCS.

The Diabetes and Home Health Care Service Connection

Virtually every study that reports utilization rates for HHC, includes the percentage of diabetics comprising the caseload. As early as 1965, the National Health Survey revealed that of 2,300,000 diabetics in the United States, 3.3 percent or 75,900 were, at one time,

part of a HHCS. Those receiving visits from a HHCS during the survey numbered approximately 1200.[44] This number, about one percent, is markedly increased when one looks at local and state HHCS reports. The percentage of Diabetes utilizing HHCS for various years and reported in three studies is shown in Table I. A strong and continuous connection between Diabetes and HHCS is evident by the steady level of diabetics utilizing HHCS over a period of years.

Although there is a strong connection between Diabetes and HHCS, obviously not all Diabetics need HHC. The variable or variables which define the relationship between Diabetes and the need for HHCS remain to be determined.

TABLE I

PERCENTAGE OF DIABETICS UTILIZING
HHCS FOR VARIOUS YEARS

YEAR	SOURCE OR STUDY	PERCENTAGE
1967	"In home Health Services in California: Some Lessons for National Health Insurance." (45)	5
1968		5.5
1969		5.4
1970		5.8
1971		6
1972		5.8
1973		6
1973	"Monroe County Patient Profiles in Home Care." (46)	5.2 (Visiting Nurse Service) 6.4 (County Health Department)
1976	"Home Health Services in New Hampshire." (47)	9 (Overall average for 8 HHC agencies)

FOOTNOTES

[1]Katherine Ricker-Smith and Brahna Trager. "In-home Health Services in California: Some Lessons for National Health Insurance." Medical Care 25 (March 1978): 174.

[2]IBID., p. 177.

[3]Deanna D. Karafiath. "Home Care Makes Sense Today." Journal of Nursing Administration 6 (June 1976): 33.

[4]Ricker-Smith, p. 179.

[5]IBID., p. 183.

[6]IBID., p. 185.

[7]Karafiath, p. 32.

[8]Social Services Directory, 1978. (Dayton, Ohio: United Way): 141, 158, 189, 284.

[9]Robert B. Mims, Loraine L. Thomas, and Mary V. Conroy. "Physician House Calls: A Complement to Hospital-based Medical Care." Journal of the American Geriatric Society 25 (January 1977): 28; Claire F. Ryder. "Home Health Services--Past, Present, Future." American Journal of Public Health 59 (September 1969): 1721.

[10]IBID., p. 1723; _____. "Basic Data Requirements for Home Health Care." Medical Care 14 (May 1976): 48.

[11]IBID.

[12]Phillip R. Fine, Sybil R. Better, and Janet L. Engstrand. "The Operations of a Hospital-Based Specialty Home Health Team: Activities and Associated Costs." ARN 3 (January-February 1978): 5.

[13]Paul A. Haber. "Hospital-based Home Care After Myocardial Infarction." Geriatrics 30 (November 1975): 74.

[14]Interview with Captain Finnegan, Community Nursing Service, Brooke Army Medical Center, San Antonio, Texas, October 18, 1978.

[15]IBID.

[16]William J. Gavett et al. Measuring the Community's Utilization of a Health Service II. (New York: Graduate School of Management, University of Rochester, 1974): 75; Ryder, Frank A. Hale and Arthur R. Jacobs. "Home Health Services in New Hampshire." Public Health Reports 91 (November-December 1976): 551; Ryder, "Basic Data Requirements"; Martha Thornock et al. "Attendant Care Needs of the Physically Disabled: Institutional Perspectives." Rehabilitation Literature 39 (May 1978): 147.

[17]Richard E. Hall. "The Need for Home Care Services: Patients Discharged From the Saint Elizabeth Medical Center, Lafayette, Indiana." (Master's Thesis, Xavier University, 1973): 28.

[18]Merwyn R. Greenlick et al. "The Objective Measurement of the Post-Hospital Needs of a Known Population." American Journal of Public Health 56 (August 1966): 1193; F. Douglas Scutchfield and Donald K. Freeborn. "Estimation of Need, Utilization and Costs of Personal Care Homes and Home Health Services." HSMHA Health Reports 86 (April 1971): 372.

[19]Greenlick, p. 1194.

[20]Hart, p. 62.

[21]Gerald M. Eggert et al. "Caring for the Patient With Long-term Disability." Geriatrics 32 (October 1977): 102.

[22]IBID., p. 103.

[23]Robert Morris, "Alternative Forms of Care for the Disabled: Developing Community Services." Birth Defects 12 (Volume 4, 1976): 132.

[24]Eggert, p. 110.

[25]Julia D. Watkins et al. "A Study of Diabetic Patients at Home." American Journal of Public Health 57 (March 1967): 452.

[26]IBID., p. 454

[27]IBID., p. 456.

[28]IBID., p. 457.

[29]T. Franklin Williams et al. "The Clinical Picture of Diabetic Control Studied in Four Settings." American Journal of Public Health 57 (March 1967): 441.

[30]IBID., p. 450; For an illustration of this method see Appendix B.

[31]David M. Kessner, Carolyn E. Kalk, and James Singer. "Assessing Health Quality--The Case for Tracers." The New England Journal of Medicine 288 (January 25, 1973): 190.

[32]Ryder, "Home Health Care Data Base.", p. 51.

[33]Carlos J. Martini and Ian McDowell. "Health Status: Patient and Physician Judgements." Health Services Research 11 (Winter, 1976): 512.

[34]Katherine Thomas. "Diabetes Mellitus in Elderly Persons." Nursing Clinics of North America. 11 (March 1976): 162.

[35]IBID., p. 161.

[36]Limitation of Activity Due to Chronic Conditions, 1974. (Rockville, Maryland: National Center for Health Statistics, June 1977): 15.

[37]IBID., p. 2.

[38]Rhode Island's Elderly Population: A Measure of Need for Home Health Services. (Providence, Rhode Island Department of Community Affairs, February 1976): 7.

[39]IBID., p. 10.

[40]J. Mernaghan. "Review of the Conference (on Ambulatory Care Records) Proceedings." Medical Care 11 (March-April Supplement, 1973): 34.

[41]Ian R. Lawson. "The Teaching of Chronic Illness and Aging in Home Care Settings." in Teaching of Chronic Illness and Aging. D. W. Clark and T. F. Williams eds. (Bethesda: NIH, 1976): 34.

[42]A. Donabedian. Aspects of Medical Care Administration (Cambridge: Harvard University Press, 1973): 410.

[43]Lawson, p. 34.

[44]Characteristics of Persons with Diabetes, 1965 (Rockville, Maryland: National Center for Health Statistics, 1967): 10.

[45]Ricker-Smith, p. 184.

[46]Gavett, p. 37

[47]Hale, p. 550.

CHAPTER III.

RESEARCH METHODOLOGY

The essential steps in the determination of need for HHCS were the development of a sample, the survey, and the criteria. The mechanisms to achieve these steps included the development of a service area, the use of an expert panel, a field test of the survey, a sample selection technique, and finally, a quantitative method to evaluate the results of the survey. Alternative solutions to the research problem, including civilian HHCS resources, will be addressed in the conclusion.

Sample Development

Development of the sample began with the identification of a ten mile service area. This identification was accomplished by drawing a ten mile radius circle around the medical center and approximating the circle to zip code configurations. The zip codes were matched with the three digit telephone exchanges as an additional identification technique. (Appendix A)

A local computer product, the diagnostic index was used to identify discharged hospital patients with the diagnostic code, 2509, for Diabetes Mellitus. This diagnostic index cross-references the hospital registration number and lists the zip code for the place of residence. The product is published quarterly and the total time frame used for sample

selection was January 1978 through January 1979. The sample selected was this fixed population with the following criteria: (1) Adult, (2) Reside within service area, (3) Diagnosis: Diabetes Mellitus, (4) Alive, and (5) Eligible for care in a military facility. The data was sifted to achieve a sample meeting the criteria and the patient's medical record was reviewed to ensure that the patient was actually diagnosed with Diabetes Mellitus. This distillation of data is portrayed in Table 2, p. 24.

A problem that emerged during the sample development was the availability of data. Although there appeared to be sufficient data resources at the beginning of the study, these sources quickly dwindled. Originally, this writer planned to utilize computer listings of abnormal blood glucose readings to identify a diabetic population within a two month period. Two limitations on this method occurred. The medical records were not available for a majority of patients and where available, it was discovered that most of the patients were not diagnosed with Diabetes. Rather, the abnormal readings were associated with drug interactions or other disease processes. The use of physician recall as a data source for a diabetic sample was also inadequate. This plan was to request that physicians in Internal Medicine and Family Practice submit lists of current diabetic patients. This source proved to be inadequate because the physicians did not have accurate counts of the diabetics and newly assigned physicians were unaware of the current diabetic caseload. It became necessary to find another data source. The source identified was the computerized listing of hospitalized patients discharged in 1978 and identified by the International Classification of Diseases (ICD) as Diabetes Mellitus. This source was the most

TABLE 2

SAMPLE DEVELOPMENT BY CRITERIA

Diabetic Admissions		I	- O	= S	- D	- A	- IN	- NDX	- NOT EL	= X
Quarter 1	69	39	10	29	1	2	1	6	2	17
Quarter 2	68	39	13	26	0	2	1	3	0	20
Quarter 3	71	35	13	22	1	2	3	4	1	11
Quarter 4	74	49	6	43	2	5	12	6	3	15
January 1979	19	11	3	8	0	1	3	2	0	2
Totals	301	173	45	128	4	12	20	21	6	65

Diabetic sample development. Where: I = number residing inside zip codes 453, 454, 455. O = number residing outside 10 mile radius and inside zip codes 453, 454, 455. S = number residing inside 10 mile radius. D = Expired in hospital A = Under age 17 IN = Repeat admission. NDX = Not diagnosed diabetic. NOT EL = Civilian emergency admissions. X = resulting sample.

comprehensive, although the IDCA code, 2509, was used to identify any glucose intolerance in addition to the diagnosis of Diabetes Mellitus.

Survey and Criteria Development

A carefully chosen panel of experts assisted in the development of a survey and criteria sets for measurement. After an extensive literature search, a basis survey and criteria were presented to the panel. The panel consisted of five members. Two physician members, an endocrinologist and a family practitioner, provided medical guidance for criteria development and also assisted in survey construction and content. Three hospital administrators were chosen to complete the panel. These panel members had respectively, a background in survey construction, quantitative techniques, and research psychology. A quasi-delphi method was used to complete the panel review. The evaluations and recommended revisions of the panel were forwarded to this researcher in writing and the variances of the panel were resolved on an individual basis. Final criteria were established for family support, disabilities, diabetic management, and medical access. (See Appendix B)

The revised criteria sets and survey were field tested by interviewing four patients. This pilot sample consisted of four diabetics; two outpatients and two inpatients. This field test was invaluable to the final revision of the survey and "de-bugging" the quantitative method. The final survey form is shown in Appendix B.

The HHC survey was conducted by telephone interview during a three week interval. A minimum of three phone call attempts constituted a non-response. This limit included calls on different days and at least

one call during the evening hours. During this survey, a problem of sample attrition occurred. Military populations are particularly difficult to survey because the population is constantly changing. The population is lost primarily through permanent change of station.[1] This phenomenon occurred in the sample for this study; there was a 20 percent attrition because of change or residence of station. A partial explanation of this attrition is that the data source was 6 to 9 months retroactive.

The Quantitative Method

The survey measured 68 variables and these variables were re-coded to form composite variables to represent the criteria sets. A computer program was developed to evaluate the survey responses against the criteria. The program was adapted to the Statistical Package for the Social Sciences (SPSS) Crosstabulation program.[2] Chi Square was used as a nonparametric tool for inference. Chi Square is represented in the following formula:

$$\chi^2 = \frac{\sum (O - E)^2}{E}$$

where: O = the observed frequencies for two or more variables. E = the expected frequencies if no relationship existed between the variables. Chi square identifies a relationship between two or more variables by producing a large integer. The Chi square result is further quantified by a level of significance (i.e. the probability of a relationship occurring by chance).[3] In this study, a significance of .05 (i.e. 5 times in 100 an event could occur by chance) will be considered statistically significant.

The Chi square test is not valid when the expected frequencies in a two by two table are less than five or in a larger table, more than twenty percent are less than five.[4] For this reason, Analysis of Variance (ANOVA) and a t-test of the difference between means will be used to support those invalid Chi square results. ANOVA is an evaluation of differences between means when the groups may be unequal. The squared variance for the groups are evaluated between the groups and within the groups and compared against a critical value of F.[5] The t-test will be used to support or refute any invalid Chi square test in this study. The following formula is used to evaluate variables:

Ho: $\sigma_1^2 = \sigma_2^2$

Ha: $\sigma_1^2 = \sigma_2^2$

$\alpha = .05$ $\quad F = \dfrac{s_1^2}{s_2^2}$

where: σ = variance
μ = population mean
s = sample variance
$\bar{x}$ = sample mean
n = number of observations.

F is measured against a critical value of F for the degrees of freedom. If this Ho is accepted then:

Ho: $\mu_1 = \mu_2$

Ha: $\mu_1 = \mu_2$

$\alpha = .05$

where: $$t_{n_1 + n_2 - 2} = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\dfrac{s_1^2 (n_1 - 1) + s_2^2 (n_2 - 1)}{n_1 + n_2 - 2}} \sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$$

where $n_1 + n_2 - 2$ is greater than 30, a z critical value is used and if less than 30, a t critical value is used. If the Ho of equal variances is rejected, then:

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

These formulae evaluate the differences between two groups of observations when the population variances and means are unknown and the groups may be unequal.[6]

Analysis Design

The analysis of the survey data will include a brief description of the sample characteristics. The survey non-responses will be addressed and a method introduced to incorporate this data into the analysis. The analysis is separated into two major parts; an evaluation of the data to identify dominant and controlling variables and determination of need proportions.

The first major portion of the analysis will evaluate the sample responses against the major test variables. These test variables will be evaluated to determine any controlling variables. This portion, using Chi square, is designed to identify which variables have a dominant influence in determining the need for HHCS. The major test variables, family support, disability, diabetic management and medical access, will be cross tabulated to identify relationships. Once established, these relationships will be examined to determine if other variables have a controlling influence. The use of insulin, age, and years of diabetes will be evaluated for controlling influence. The following hypotheses apply to this portion of the analysis:

(1) Ho: A given major test variable is not a dominant criterion in

the determination of need for HHCS.

Ha: A given major test variable is a dominant criterion in the determination of need for HHCS.

(2) Ho: Insulin dependent diabetics meet criteria in the same manner as non-insulin dependent diabetics.

Ha: Insulin dependent diabetics do not meet criteria in the same manner as non-insulin dependent diabetics.

(3) Ho: The number of years of diabetes is not related to the major test variable.

Ha: The number of years of diabetes is related to the major test variables.

(4) Ho: The age of the respondent is not related to the major test variables.

Ha: The age of the respondent is related to the major test variables.

Having determined the dominant variables and controlling factors, the proportion of respondents not meeting the criteria will be identified. The proportion of respondents comprising a low and high probability of need for the dominant variables will be identified. This proportion will be used for hypothesis testing.

As noted in the literature review, 5.2 percent of the hospitalized patients in the Hart study demonstrated a high probability of need for HHC. The combined averages of diabetics utilizing HHCS in Table 1 will be used as an additional best point estimate against which to measure this sample. That average is 6 percent. From these two estimates, the following hypothesis is derived:

Ho: Among diabetics hospitalized at the USAF Medical Center at Wright-Patterson AFB in January 1978 through January 1979, greater than or equal to 5.2 percent demonstrate a need for HHCS.

Ha: Less than 5.2 percent demonstrate a need for HHCS.

The following formula will be used to test this hypothesis:[7]

$$P(\tilde{p}) \mid P = 5.2,\ n = 34,\ \alpha = .05$$

where: $Z_{\tilde{p}} = \frac{\tilde{p} - P}{\sigma_p}$ and: $\sigma_p = \sqrt{\frac{\tilde{p}\ (1-\tilde{p})}{n}}$

Civilian HHC Resources

As a corrollary to the survey, a mini-study of the utilization rates of civilian HHCS was conducted. Four agencies which provide HHCS were identified in the two counties surrounding Wright-Patterson AFB. Questionnaires were sent to these agencies to determine the number of Department of Defense (DOD) diabetics receiving service from these agencies. Because these agencies are the only source of HHCS, for DOD beneficiaries in these counties, the use or nonuse of these services is important to the determination of need for a federal HHCS.

Footnotes

[1]Thomas J. Eslick. "A Study of the Methodology Used to Measure the Eligible Military Health Services (MHSS) Beneficiary Population Within a Catchment Area." Masters' Thesis, Xavier University, (May 1978): 55.

[2]Normal H. Nie. Statistical Package For the Social Sciences, 2nd Ed. (New York: McGraw-Hill, 1975): 218.

[3]IBID., p. 223.

[4]"Chi Square Test of Independence." Academy of Health Sciences, U. S. Army Health Care Administration Division, San Antonio, Texas, Mimeographed. u.d. p. 6.

[5]Richard J. Larsen. Statistics For the Allied Health Sciences. (Columbus, Ohio: Merrill Publishing Company, 1975): 278.

[6]"Hypothesis Testing for the Difference Between Two Means When σ_1^2 and σ_2^2 are unknown and either n_1 or n_2 is less than 30." Academy of Health Sciences, US Army Health Care Administration Division, San Antonio, Texas. Mimeographed. u.d. p. 1.

[7]"Hypothesis Testing for the Difference Between Two Population Proportions." Academy of Health Sciences, US Army Health Care Administration Division, San Antonio, Texas. Mimeographed, u.d., p. 1.

CHAPTER IV.

ANALYSIS AND FINDINGS

The Sample Representativeness

As noted in Table 2, the final sample for the home health survey was 65. This number represents the diabetics hospitalized during 1978 and January of 1979 and those who meet the criteria for the sample. To further identify the representativeness of this sample, a comparison with a 1977 study was accomplished. That study revealed that 68 percent of the catchment population for Wright-Patterson Medical Center resided inside the area zip code 453, 454, and 455 surrounding the base. This percentage was based on a sample of 10022 inpatient records.[1] As noted in Table 2, 173 of 301 diabetics resided within these area codes in this sample development. It would appear that these percentages differ by about 10 percent. This difference probably represents the difference between active duty military members in these zip codes and in the diabetic admissions. In the final diabetic sample, only two individuals were active duty military. A statistical test of the population proportions was performed for the samples to examine the differences. The following hypothesis is stated:

$$\text{Ho: } P_2 - P_1 \leq .1 \qquad \alpha = .05$$

$$\text{Ha: } P_2 - P_1 > .1$$

Where: P_1 = the diabetic population proportion; P_2 = the 1977 catchment

population proportion; $\tilde{p}_1$ = the diabetic sample proportion; $\tilde{p}_2$ = the 1977 sample proportion. Using the population proportion formula cited in Chapter III, the following results were found:

$$z_{\tilde{p}_2 - \tilde{p}_1} = \frac{.68 - .574 - (.1)}{\sqrt{\frac{.574\ (.426)}{301} + \frac{.68\ (.32)}{10022}}}$$

$z_{\tilde{p}_2 - \tilde{p}_1} = .32$ Critical $z_{.05} = 1.64$ Accept Ho.

The two samples are different by 10 percent. This evaluation infers that the diabetic sample is fairly representative of the diabetic population who are hospitalized at this medical center.

Further, the total diabetic population residing within the service area can be estimated by comparing the sample criteria to the estimated diabetic population in the catchment area. (See Appendix C) The estimate of the diabetic population meeting the sample criteria is 406. This estimate reveals that the sample represents approximately 16 percent of the diabetics residing in the service area.

Survey Nonresponses

The survey nonresponses were 31 out of the 65 in the sample. The reasons for these nonresponses are listed in Table 3 below:

TABLE 3

SURVEY NONRESPONSES

Change of residence	11	
Expired	3	
Not diabetic	1	
Out of town	2	
Refused to respond	1	
Unable to contact	11	
Resided outside radius	2	Total: 31

The nonresponses included three who expired, one who was not diagnosed with Diabetes Mellitus, and two who lived outside the radius. These nonrespondents did not meet the sample criteria and were removed from the sample. The resulting sample was 59. The response proportion was 57.6. This response percentage is not adequate to generalize about the diabetic population. Using the following formula, the sample responses must equal 51 to generalize with 95 percent confidence.[3]

$$\text{Sample size} = \frac{(.9604)\ (59)}{.9604 + (.0025)\ (59)}$$

One way to overcome this problem of nonresponse, is to assume that the nonrespondents do not need HHC.[4] That is, they are all healthy and functional. In part at least, this assumption is logical. The nonresponses when no telephone contact could be made after several attempts, indicate the person was away--working or engaged in other activities. This is a strong indication that the individual is healthy and functional. Although the test variables were evaluated with the sample responses, the final tabulations for determination of need will incorporate this bimodal approach.

The Survey Responses

Thirty-four responded to the survey and the survey questions were completely answered. The survey responses were coded for computer use and the survey response frequencies by variable code are displayed in Appendix D. The next section of this chapter will provide an evaluation of these survey responses.

Evaluation of the Major Test Variables

The requirement to develop a model competed with the determination of need study. This model development required that the test variables be evaluated to determine which of the variables or variable elements were controlling the determination of need for HHCS. The major test variables were compared with one another to test for independence with Chi square. The hypothesis can be stated:

Ho: The test variables are independent.

Ha: The test variables are not independent (are related).

The results of these tests are shown in Appendix E. At the .05 significance level, the hypothesis level is accepted and none of the test variables are related.

Because the Chi square test did not meet the criteria for validity, a t-test for the difference between means and variance was performed for crosstabulations. For these crosstabulations, family support by diabetic management and disability by diabetic management, the above hypotheses apply. The first hypothesis was rejected; family support is related to diabetic management. The second hypothesis was accepted, disability has no effect on diabetic management. (See Appendix F)

The criteria for family support, in this study, are fairly simplistic; there is or there is not family support. Conversely, the variable disability, is composed of three diverse, composite variable elements. These elements are mobility, vision, and activity restriction. A t-test shows that although mobility and visual disability are strongly related, vision and activity restriction are independent. (Appendix F) Because of this test, activity restriction was removed from the disability measurement and treated as a separate

variable to evaluate against the major test variables.

This operation being completed, the revised variables were evaluated with diabetic management and it was revealed that disability and diabetic management were strongly related. (Appendix G) Activity restriction and diabetic management were not related. (Appendix F) The inference here is that although disability and activity restriction are related, disability (i.e. mobility and vision), has a greater impact on the ability to manage at home than does activity restriction.

Having determined that disability is strongly related to diabetic management, family support and disability must be examined. It has already been noted that family support and disability are independent. With the revised disability variable, the independence remains between the two variables. (See Appendix C) It can be seen that just about as many who are disabled have family support as those not disabled. A t-test does not show a relationship between these two variables. (Appendix F) Looking at the two variables in a logical fashion, it does not follow that the two would be related. That is, family support is not contingent upon one being disabled nor is disability contingent upon family support. The two variables are truely and logically independent. However, it does appear that diabetic management is contingent upon family support and disability. That is, regardless of disability, persons with low family support tend to manage poorly and those with high family support tend to manage their diabetes better at home. Regardless of family support, high or low, disabled persons tend to manage poorly at home and those not disabled, tend to manage their diabetes better at home.

As noted, family support and diabetic management are related in

a t-test. Likewise, revised disability and diabetic management are related. Upon examining other variables for control, an interesting phenomenon occurs. Morris Rosenberg, in his book, Logic of Survey Analysis, describes a method of determining controlling variables.[5] The method is explained in this manner: When the association between an independent and dependent variable is positive, and the relationship with the contingent associations are zero, then the original relationship vanishes when the test factor is introduced.[6] This phenomenon is illustrated in this study. The independent variable, disability, is related in a positive fashion to the dependent variable, diabetic management. Disability is independent of family support; a zero relationship exists. When high family support is introduced as a control on disability and diabetic management, the original relationship vanishes and there is no relationship. (Appendix G) This phenomenon reveals high family support to be a controlling variable on the relationship between disability and diabetic management. A t-test was used to evaluate the relationship between family support and diabetic management by controlling for disability. This t-test showed a positive relationship where none existed before between family support and disability. (Appendix F) This finding further explains that those with low family support who are disabled, tend to manage poorly at home. It can be concluded that family support transcends disability in this study, and of the two, family support is the dominant influencing variable for diabetic management.

The dominance of disability as a determining factor will be examined in more detail later. There is a fourth major test variable that must be examined; that variable is medical access. Although

medical access was evaluated against numerous other variables, not a single relationship was discovered. It should be noted that, generally, the respondents felt that medical access was adequate. As can be seen in Appendix H, over half of the respondents had excellent medical access. This variable was controlled for the usual interval between physician visits. Although the criteria were originally scaled to assign a poor score to intervals greater than 15 weeks, the panel felt that this score was too rigid. Accordingly, it was decided to allow the patient to self-score this interval by stating whether the interval was satisfactory. Only two respondents were dissatisfied with the interval. Medical access scores without this control were evaluated against other variables and no relationship was found. The implication here is that medical access for this group of patients was adequate for the aspects of access measured. There was, however, one exception.

When the medical access criteria were parsed and evaluated by Chi square against the other major test variables, reliability of transportation was found to be related. (Appendix H) Because of the unusual sample distributions for these variables, a t-test could be performed for only one--family support. Family support was not related to transportation reliability by t-test. (Appendix F) It was necessary to use ANOVA to evaluate diabetic management and disability with transportation reliability. The ANOVA revealed a striking difference between the means of disability and diabetic management when compared to transportation reliability. (Appendix H) Those who are disabled or managing poorly at home also tend to have a great deal of difficulty getting transportation to the hospital. This finding reveals that

transportation reliability is a measure of need for HHCS in this study.

The relationship between disability and diabetic management was telling. These two variables were examined further to discover whether other variables may control this relationship. These variables included age, years of diabetes, and insulin dependence. Years of diabetes and insulin were not related to age in this sample. However, disability was related to age; older patients had more disability. (Appendix F) Age was not related to family support, diabetic management, or medical access. Disability, diabetic management, and family support were not related to the years of diabetes.

Of all the extraneous variables tested, insulin dependence was found to have the most influence. The use of insulin was found to be strongly related by Chi square to diabetic management and disability. (Appendix I) Chi square was also positive when the relationship between disability and diabetic management was controlled with insulin use. (Appendix I) It should be noted here that there were 22 who used insulin and only 12 who did not use insulin in the sample. This difference explains the absence of a statistical relationship when a t-test was performed for insulin with diabetic management. (Appendix F) Although there was no relationship between insulin and diabetic management, a t-test revealed a negative relationship between insulin and disability. (Appendix F) That is, more nondisabled persons use insulin and more disabled persons do not use insulin. The introduction of this negative finding explains the high correlation between disability and diabetic management. The negative finding tells us that the nondisabled take insulin and therefore, manage better at home

and the disabled manage worse because they do not take insulin. A t-test also revealed a high relationship when disability and diabetic management were controlled for the use of insulin. (Appendix F) It is suggested here that nondisabled insulin users manage better because they use insulin. To avoid the side effects of insulin, a strict regimen is maintained and is reflected in the high scores for diabetic management.[7] It follows that those using insulin and managing poorly, have a high probability of need for HHCS.

In this sample, insulin nonuse explains away the relationship between disability and diabetic management. Those not taking insulin do not manage as well at home. (Appendix F) The relationship between disability and diabetic management vanishes when the respondents are not taking insulin. This phenomenon reveals that insulin nonuse controls the relationship between disability and diabetic management. It tells us that in this sample, poor management does not depend on disability for insulin nonusers.

When family support and diabetic management were controlled by the variable, taking insulin, a positive relationship remained. Those taking insulin with low family support tended to manage more poorly than those with high family support. (Appendix F) Unfortunately, the small sample does not allow an adequate evaluation of those with low family support and insulin nonuse.

In summary of this analysis, it can be concluded that family support is a dominant variable. Further, disability is a dominant variable when the diabetic is taking insulin and a poor manager. The sum of these variable combinations determines the need for HHCS in this sample. In this study, the high probability of need will include

those with low family support plus those taking insulin and managing poorly at home. The major test variable, medical access, showed no relationship with any variable and cannot be used to determine a need for HHCS. The element of medical access, reliability of transportation, was profoundly related to disability and diabetic management. This variable must be included in the sum of variables which contribute to the need for HHCS.

The Determination of Need Calculations

Based on the evaluation of the major test variables, the determination of need was calculated. This calculation was accomplished by examining each case to avoid duplication of cases. Four groups were identified based on the findings in this study. The first group included those with low family support who were disabled and managing poorly. The second group contained those with high family support who were taking insulin, managing poorly, and disabled. The third group included those who were taking insulin, nondisabled, and had high family support. The fourth group was composed of the disabled with a great deal of transportation difficulty. Table 4 shows these sums by group and by case. It can be seen that no person was limited to failure of one criteria, but at least two criteria sets were failed. This group of people comprise the high probability of need for HHCS based on the evaluations in this study.

Sample Proportion Comparison

In the literature review, the proportions of need for HHCS from other studies were stated. The Hart study cited 5.2 percent and the HHCS studies (Table 1) reported a 6 percent average for diabetics

TABLE 4

CALCULATIONS FOR THE DETERMINATION
OF NEED FOR HHCS

Groups

Group 1: low family support, disabled, poor management.	3
Group 2: high family support, insulin users, poor management, disabled.	1
Group 3: insulin users, poor management, nondisabled, high family support	1
Group 4: disabled, a great deal of transportation difficulty.	2
Total	7
Proportion of responses	.205
Proportion of adjusted sample	.118

Cases

Case	Low Support	Poor Management	Disabled	Transportation Difficulty	Insulin
22	Yes	Yes	Yes	Yes	Yes
30	No	Yes	No	No	Yes
34	No	Yes	Yes	No (some)	Yes
36	Yes	Yes	Yes	No (some)	No
37	Yes	Yes	Yes	No	Yes
45	No	Yes	Yes	Yes	No
54	No	No	Yes	Yes	No

utilizing HHCS. The proportions in this study as calculated in Table 4 were .205 percent for the sample respondents and .118 for the adjusted sample to include nonrespondents. This sample proportion is higher than that reported in other studies, however, the sample is much smaller. There are obvious differences between this diabetic sample and the reported proportions from the other studies. The Hart and study included a larger proportion of the elderly hospitalized while this study targeted a younger chronically ill group. The HHCS studies reported in Table 1, reflect actual utilization (effective demand) of HHCS rather than need. Despite the differences, these point estimates give some indication that the need in this sample is not unlike the need in other populations. To compensate for these differences, it can be estimated that the samples are different by less than five percent. These populations were evaluated to discover if the difference is less than five percent for the diabetic samples in this study and the other studies. See Appendix J. The respondent sample is greater than 5 percent different from the Hart and composite HHCS studies. The difference between the diabetic sample, adjusted for nonresponses, and the other studies is nonexistent. Considering the differences in study methodologies, the results are fairly comparable. It can be concluded that the HHCS need in the diabetic sample is similar to the need for HHCS in other populations.

Civilian HHC Resources

A survey of the HHC agencies immediately surrounding Wright-Patterson AFB was conducted. Of the four agencies surveyed, three responded. These agencies reported a total of four Department of Defense (DOD) families

who utilized the HHC services during the past year. It is estimated that approximately eight families were referred to the four agencies in Greene and Montgomery counties.[8] The agency that did not respond is, therefore, estimated to have served four DOD families. This utilization of HHC agencies is low. It can be postulated that the reasons for this low utilization involve cost to the patient, as in the Brooke Army Medical Center situation, and misinformation about the services available. This misinformation is described as lack of knowledge on the part of the providers and the clients about the types of services available.[9]

It is suggested that misinformation and cost reasons for non-utilization would not be a problem for a federal hospital-based HHCS. Further, these barriers to utilization of civilian HHC services are a justification for a federal HHCS. This study has indicated that a high probability of need exists within a target population--diabetics, yet the utilization of available civilian resources is nil.

Alternates to a Federal HHCS

An alternative to a federal HHCS is to provide appropriate information to providers and clients about civilian resources. This information includes the types of services available in the civilian HHCS. Although this alternative does not compensate for cost barriers, it would decrease the misinformation barrier to utilization.

Having identified a high probability of need in a select group, another alternative to a HHCS is to target this group for more intensive patient education within the present medical center resources. Although the diabetic sample respondents were generally knowledgeable about the

disease process, those who failed to meet the criteria established in this study are identified as needing education in home management. This educational need includes knowledge of the available resources for transportation and methods of managing disabilities at home in addition to disease control knowledge. It is suggested that this education is an important adjunct to diabetic education.

The cost barrier is a problem that cannot be overcome without changes to reimbursement legislation. CHAMPUS (Civilian Health and Medical Program of the Uniformed Services) will only reimburse for skilled nursing care.[10] As stated in the literature review, this type of specialized care does not supplant the need for medical supervision and support in the home. It is suggested that this cost barrier can only be removed by establishing a federal HHCS. A study of the feasibility of establishing a federal HHCS would include a comparison of this cost barrier with the need for HHCS in the eligible population.

Footnotes

[1]Thomas J. Eslick, "A Study of the Methodology Used to Measure the Eligible Military Health Services (MHSS) Beneficiary Population Within a Catchment Area." Masters' Thesis, Xavier University. (May, 1978): 39.

[2]Prevalence of Chronic Conditions of the Genitourinary, Nervous, Endocrine, Metabolic, and Blood and Blood-Forming Systems and of Other Selected Chronic Conditions--United States--1973. (Rockville, Maryland: National Center For Health Statistics, 1977): 18.

[3]"Opinion Research Methods." Academy of Health Sciences, Health Care Administration Division, Annex D to APC Model # 15, Mimeographed. u.d. p. D-4.

[4]S. James Kilpatrick. Statistical Principles in Health Care Information. (London: University Park Press, 1977): 64.

[5]Morris Rosenberg. Logic of Survey Analysis. (New York: Basic Books, 1968): 101.

[6]IBID.

[7]Interview with Stephen McDonald M.D., USAF Medical Center, Wright-Patterson AFB, Ohio, March 27, 1979.

[8]Interview with Anne Wiesen, Red Cross Field Director, USAF Medical Center, Wright-Patterson AFB, Ohio, October 13, 1978.

[9]IBID.

[10]"Nursing Care Under the CHAMPUS Basic Program." Armed Forces Information Service, Department of Defense. Brochure. p. 3.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study comprised two major entities; the development of a model for determining the need for HHCS and the actual determination of need for HHCS in a target population. The model development emanated from the identification of major test variables for the determination of need for HHC services in a diabetic population. These test variables included the development of criteria and the development of a measurement tool--the survey. As the study progressed, the test variable evolved from the original variables to an altered form. This phenomenon occurred because the model was developed at the same time the actual determination of need was occurring. By using the measurement tool, the major variables were tested, found to be dominant or weak, and reevaluated to discover the basis of the variable relationships. As a result, the study began with the variables evenly weighted and culminated with weighting by dominance.

The major test variables as noted in Table 1, were family support, disability, diabetic management, and medical access. Disability was reorganized and reevaluated when a weak element, activity restriction, was identified. Family support was identified to be dominant and strong and it was not changed. The diabetic management criteria were altered prior to the field test based on the expert panel

recommendations. (See Appendix B for the control on urine testing) Diabetic management performed well as a dependent variable throughout the evaluations. Medical access was found to be a weak variable, was analyzed, and the strong element, transportation reliability, was freed to interact with the other variables. An extraneous variable was found within the measurement tool and outside the major test variable parameters. This variable was insulin use. This element became a major test variable to explain the interaction of other test variables. The model development concluded with the identification of five major test variables to determine the need for HHCS.

The second major portion of the study was the determination of need for HHCS in a target population. By using a select group, diabetics, the model could be adapted to the characteristics of this population. This portion of the study was the actual determination of need for HHCS. The determination portion included the development of the sample and the survey of the population. The sample adapted well to the model with the exception that a larger sample would have demonstrated the variable interaction more clearly. The sample was composed of hospitalized diabetics at this medical center in 1978 and January of 1979. This sample development occurred as a result of criteria development for the sample and identification of data sources. The resulting sample was an identified target group limited to previous inpatients at this facility.

The two major portions of the study, model and target population, were married by the survey and evaluation of the sample to determine the need for HHCS. The conclusion of the study is that there is a need for HHCS in this target population. The proportion of previously

hospitalized diabetics who have a high probability of need is approximately 10 percent. Conversely, the larger proportion, 90 percent are functional and healthy and have a low probability of need for HHCS.

Recommendations

1. It is recommended that the major test variables identified in this model be considered for use in determination of need studies for HHCS in diabetic populations.

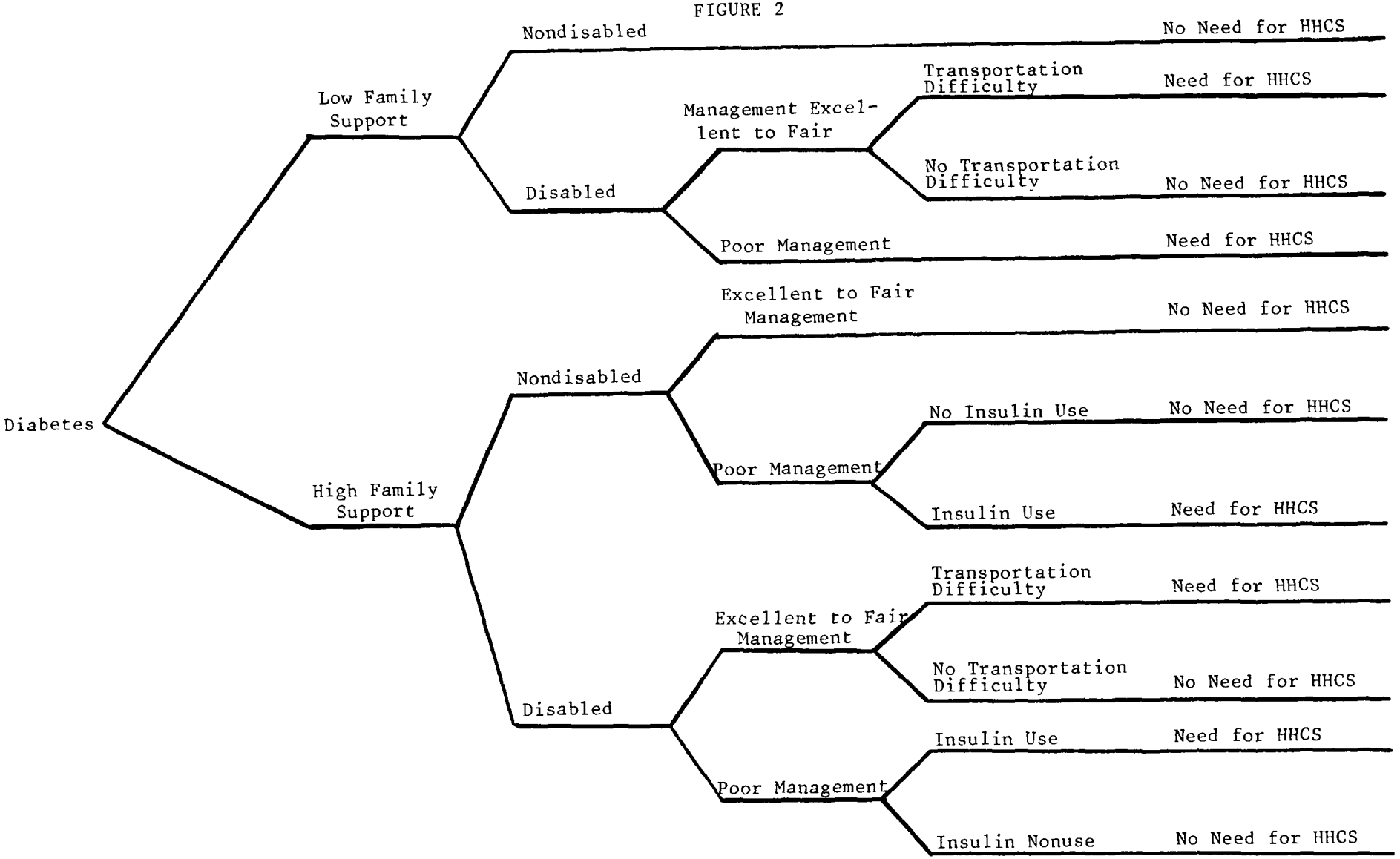
2. The method of targeting groups of patients with common characteristics (i.e. Diabetics) is a viable way to determine need for HHCS in general populations.

3. Ten percent of the population surveyed in this study have a high probability of need for HHCS and are not now using HHCS. It is recommended that these identified persons be the object of an intensive educational process within the resources of this medical center. This study has identified these persons and some support can be provided by intensifying the educational effort for people in the high probability of need category. These folks should have a high priority for patient education. A model for identifying these persons is shown in Figure 2.

4. It is recommended that providers and clients be appraised of the HHC services available in the civilian community.

5. Because of the needs identified in this study, the feasibility of establishing a federal HHCS should be conducted.

FIGURE 2


Diabetes
Low Family Support
High Family Support
Nondisabled
Disabled
Nondisabled
Disabled
Management Excellent to Fair
Poor Management
Excellent to Fair Management
Poor Management
Excellent to Fair Management
Poor Management
Transportation Difficulty
No Transportation Difficulty
No Insulin Use
Insulin Use
Transportation Difficulty
No Transportation Difficulty
Insulin Use
Insulin Nonuse
No Need for HHCS
Need for HHCS
No Need for HHCS
Need for HHCS
No Need for HHCS
No Need for HHCS
Need for HHCS
Need for HHCS
No Need for HHCS
Need for HHCS
No Need for HHCS

APPENDIX A

The HHC Service Area

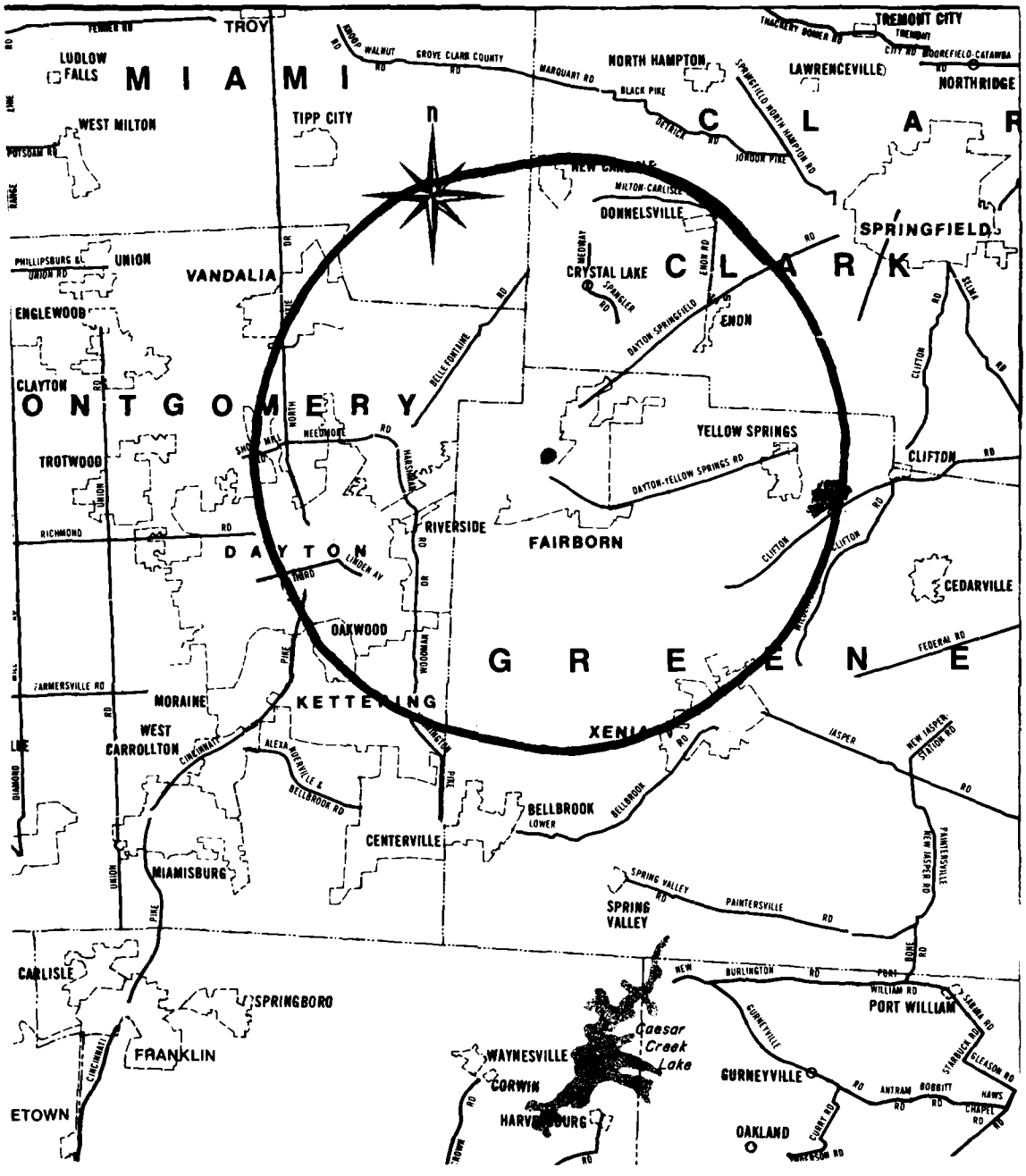


Figure 5: The Hypothetical Service Area for the Determinations of Need for HHCS; A 10 Mile Radius Around USAF Medical Center Wright-Patterson AFB, Ohio.

10 MILE RADIUS

ZIP CODES	TELEPHONE EXCHANGES	
45301	222	457
45319	223	461
45323	224	499
45324	225	767
45341	226	849
45344	227	864
45355	228	873
45371	229	878
45385	233	879
45387	236	882
45402	237	
45403	252	
45404	253	
45405	254	
45407	255	
45409	256	
45410	257	
45414	258	
45419	274	
45420	293	
45424	299	
45431	372	
45432	376	
45433	426	
45435	429	
45502 (Snyderville)	443	
45502 (Hustead)	449	

FIGURE 6: The Zip Codes and Three Digit Telephone Exchanges Included in the Service Area.

APPENDIX B

CRITERIA SETS AND HOME HEALTH SURVEY

CRITERIA SETS

I. Disability; DISAB: Variables 8 + 9 + 10 + 11 + 12 + 13 + 14 + 15 + 16 + 17 + 19 + 21 + 23 + 25 + 27 + 29 + 31 + 33 + 58 + 59 + 60.

Group 1: Low probability of Home Health Care need; no dysfunction; Σ variables = 0.

Group 2: High probability of Home Health Care need; one or more disabilities in three major areas of ability; Σ variables = 1 or more.

Areas of ability:

Mobility: Variables 12 + 13 + 14 + 15 + 16 + 17 + 19 + 21 + 23 + 25 + 27 + 29 + 31 + 33.
Visual: Variables 58 + 59 + 60.
Activity Restriction: Variables 8 + 9 + 10 + 11.

Within each ability area, one or more contributing problems is equal to disability in the entire area.

II. Family Support; FAMSUP: Variables 4 + 18 + 20 + 22 + 24 + 26 + 28 + 30 + 32.

Group 1: High support; Σ variables = 0

Control score		
0	1.	Lives with other adults
0 and 2.		Needs help but family provides assistance.

Group 2: Low support; Σ variables > 0

Control score		
> 0	1.	Lives with spouse or relative or others; needs help, but does not receive help from family.
> 0	2.	Lives alone and needs help and others or noone helps.

III. Diabetic Management at Home; DIAMAN: Variables 54 + DIAKNO + 44 + 45 + 48 + 50. Diabetic Knowledge; DIAKNO: Variables 42 + 43 + 49 + 56; scores = (0) all correct (1) 1 or 2 correct (4) 1 or 2 correct (17) none correct.

Group 1: Excellent management

Control Score

0 Follows diabetic diet

0 and Voices correct knowledge of reaction, care of feet, and testing of urine.

0 and Tests urine at least 21 times a week

0 and Uses results in management.

0 and Weight $\bar{<}$ 10% above national average for height, sex, and age.

Group 2: Good management

Control Score

1 Voices correct knowledge of 2 diabetic knowledge questions

1 and Tests urine at least 10 times a week; less than 21.

1 and Weight > 10% above national average and has lost weight in past 12 months.

Score 1-3

Group 3: Fair management

Control Score

4 Does not follow diabetic diet

4 and Voices correct knowledge of 1 diabetic knowledge question.

4 and Tests urine $\bar{>}$ 3 times a week; less than 10.

4 and Does not use results in management.

Score 4-16

Group 4: Poor management

Control Score

17 Voices incorrect knowledge of all diabetic knowledge questions.

17 and Tests urine less than 3 times per week.

17 and Weight > 10% above national average and no lost weight in 12 months.

Score $\bar{>}$ 17

Note: If results of urine testing are used in home management, then the number of urine tests per week equals 21.

IV. Medical Access

Group 1: Excellent access

Control Score

0 $\bar{<}$ 6 weeks pass between physician visits.

0 and $\bar{<}$ 6 phone calls for appointment.

0 and Appointment time always available.

0 and The interval between visits is adequate

0 and Hardly any trouble at all getting transportation to hospital.

Group 2: Good access

Control Score

1 > 6 $\bar{<}$ 10 weeks pass between appointments.

1 and > 6 $\bar{<}$ 12 phone calls for appointment.

1 and $\bar{>}$ 1 < 5 times appointment not available.

1 and Some trouble getting transportation to hospital.

Score 1 - 4

CRITERIA SETS

Group 3: Fair access

Control Score

5 >10 $\bar{<}$ 15 weeks pass between appointments.

5 and >12 $\bar{<}$ 18 phone calls for appointment.

5 and $\bar{>}$5 < 10 times appointment not available.

Score 5 - 20

Group 4: Poor access

Control Score

21 > 15 weeks pass between appointments.

21 and > 18 phone calls for appointment

21 and The interval between visits is much too lengthy.

21 and $\bar{>}$ 10 times appointment not available.

21 and A great deal of trouble getting transportation to hospital.

Score $\bar{>}$ 21

CODE_____

HOME HEALTH SURVEY

SECTION I. DEMOGRAPHICS

1. What is your age?

_____ (1) 18-24
_____ (2) 25-34
_____ (3) 35-44
_____ (4) 45-54
_____ (5) 55-64
_____ (6) 65-74
_____ (7) 75-79

2. What is your sex?

_____ (1) Male
(2) Female

SECTION II. FAMILY UNIT

3. Are you----married?
widowed?
divorced?
never married?

_____ (1)
_____ (2)
_____ (3)
_____ (4)

4. How many adults reside in your living quarters? (16 and over)

_____ (0) GT 0
NONE (1) & go to Section III.

5. What is the relationship to the adults in your living quarters?

☐ Combination (spouse, relatives, and others) (1)
☐ Spouse (2)
☐ Relatives (3)
☐ Others (4)
☐ N/A (5)

SECTION III. ACTIVITY RESTRICTION

6. Do you work regularly? (work means housework, job, or business)

_____ (0) Yes
(1) No

7. If no: are you retired?

_____ (0) Yes
_____ (1) No

8. If no: Do medical problems keep you from working?

_____ (1) Yes
(0) No

9. During the last 2 weeks, how many days were you ____ confined to bed because of illness or injury?

_____
(0) None
(1) 1-4
(2) 5-8
(3) 9-12
(4) 13-14

10. Apart from the days confined to bed, were there any days within the last two weeks you were not able to do the things you usually do because of not feeling well?

_____
(1) Yes
(0) No

11. If yes: how many days?

_____
(0) None
(1) 1-4
(2) 5-8
(3) 9-12
(4) 13-14

SECTION IV. HEALTH ASSESSMENT

12. In terms of health must _____ stay in bed all or most of the time?

_____
(1) Yes
(0) No

13. In terms of health must _____ stay in the house all or most of the time?

_____
(1) Yes
(0) No

14. Does _____ need the help of another person in getting around inside or outside of the house?

_____
(1) Yes
(0) No

15. Does _____ need the help of some special aid such as a cane or wheelchair in getting around inside or outside the house?

_____
(1) Yes
(0) No

16. Although _____ does not need the help of another person or a special aid, does _____ have trouble getting around freely?

_____
(1) Yes
(0) No

SECTION V. HOME CARE ASSESSMENT

You mentioned that_____needed help of some kind in your home. I am going to read a list of different kinds of personal care some people need in the home. Please tell me if_____needs help in any of the following ways:

					If yes: Who Helps?
Does_____	need help--				
17.	in walking up stairs or getting from room to room?	_____	(1) Yes (0) No	18.	(0) Family NA (1) Other (2) Noone
19.	in dressing or putting on shoes?	_____	(1) Yes (0) No	20.	(0) (1) (2)
Does_____	need help--				
21.	with changing bandages?	_____	(1) Yes (0) No	22.	(0) (1) (2)
23.	in receiving injections	_____	(1) Yes (0) No	24.	(0) (1) (2)
25.	in receiving medications	_____	(1) Yes (0) No	26.	(0) (1) (2)
Does_____	need help--				
27.	in changing bed positions?	_____	(1) Yes (0) No	28.	(0) (1) (2)
29.	in exercising or physical therapy?	_____	(1) Yes (0) No	30.	(0) (1) (2)
31.	in cutting toenails?	_____	(1) Yes (0) No	32.	(0) (1) (2)

33. Because of_____health, must someone be in the house with _____all of the time, part of the time, or only when providing the needed care?

all of the time	(3)
part time	(2)
providing care	(1)
NA	(0)

34. Have you ever had a nurse or other health worker come to your home to help you in taking care of yourself?

_____ (1) Yes
(0) NO go to Section VI

35. How many times has this person visited you in the past 12 months?

_____ (0) None
(1) 1-5
(2) 6-10
(3) more than 10

36. Did you pay for this health worker to come to your home?

_____ (1) Yes
(0) No

37. If yes: How did you pay for these services?

CHAMPUS (1)
Self (2)
Insurance (3)
Medicare (4)
Medicaid (5)
Other (6)
NA (7)

SECTION VI. DIABETIC HISTORY AND KNOWLEDGE

38. About how many years have you known that you have diabetes?

_____ (1) <1
(2) 1-5
(3) 6-10
(4) 11-15
(5) >15

39. Are you now taking insulin injections?

_____ (1) Yes
(0) No

40. Who injects the insulin?

Self (0)
Relative (1)
Nurse (2)
Other (3)
NA (7)

41. Who taught you how to inject the insulin?

Doctor (1)
Nurse (2)
Relative (3)
Other (4)
Not taught (5)
NA (7)

42. What causes a low sugar reaction?

too much insulin or too little sugar (0)

incorrect (1)

43. What should a diabetic do when he has a low sugar reaction?

immediately eat sugar	(0)
incorrect	(1)

44. Do you test your urine for sugar? _____

(0) Yes
(17) NO go to 49

45. How many times did you test your urine last week? ____ __

(0) ≥ 21
(1) $\geq 10 < 21$
(4) $\geq 3 < 10$
(17) < 3

46. When was the last time you tested it? _____ _

(0) ≤ 30 days
(1) > 30 days

47. Do you write down any of the results of these tests? ____ __

(0) Yes
(1) No

48. Do you use these results? _____
(yes means show to Dr., adjust diet or activity)

(0) Yes
(1) No

49. *When should routine urine tests for* sugar be done?

just before meals	(0)
incorrect	(1)

50. About how tall are you? _____feet

_____inches

About how much do you weigh? _____pounds

What is the most you have weighed during the past 12 months? _____pounds

What is the least you have weighed during the past 12 months? _____pounds

51. Who prepares most of your meals?

Spouse or relative	(0)
Self	(1)
Other	(2)

52. Have you been given a diet for your diabetes? _____

(0) Yes
(1) No

53. Who taught you how to use this diet?

Doctor (1)
Nurse (2)
Parent (3)
Dietitian (4)
Other (5)
Not taught (6)

if not taught--who gave the diet?
_____occupation

54. Do you follow this diet? (yes means usually or most of the time) _____ (0) Yes (4) No

55. Were you taught how to take care of your feet to avoid infection? _____ (0) Yes (1) No

56. How do you take care of your feet?

Inspect daily; wash with soap and water daily; dry thoroughly; keep clean and dry; fitted shoes; wear stockings; avoid exposure to extreme hot and cold temperatures; report skin irritations to the doctor; cut toenails straight across. (0)

_____

_____

_____

incorrect (1)

57. Have you been to a doctor to have your eyes examined during the past two years? _____ (0) Yes (1) No

58. Can you see well enough to read newspaper print with glasses? _____ (0) Yes (1) No

59. Can you see well enough to recognize a friend walking on the other side of the street? _____ (0) Yes (1) No

60. How much trouble would you say that you have in seeing---a great deal, some, or hardly at all?

a great deal (2)
some (1)
hardly at all (0)

SECTION VII. PHYSICIAN ACCESS

61. Where do you usually go for care of your diabetes--Wright-Patterson AFB, a civilian doctor, or some other place?

WPAFB	(1)
Civilian	(2)
Other	(3)

62. How many weeks have passed since you last visited your doctor for diabetes? _____

(0) ≤6
(1) >6

63. How many weeks usually pass between appointments with your doctor? (for diabetes?) _____

(0) ≤6
(1) >6 ≤10
(8) >10 <15
(21) >15

If walk-in: why?

64. How would you rate the length of time between appointments---much too long, somewhat long, or adequate?

adequate	(0)
somewhat long	(1)
much too long	(21)

65. How many times did you telephone to get medical advice for diabetes from your doctor or clinic between your last two appointments? _____

(0) 0
(1) ≥1 <10
(5) >10 ≤20
(21) ≥ 21

66. When you made your last appointment how many times did you call before you contacted the appointment desk? _____

(0) ≤6
(1) >6 ≤12
(5) >12 ≤18
(21) > 18

67. During the past 12 months, how many times has an appointment time not been available when you have called for one? _____

(0) 0
(1) ≥1 <5
(5) ≥5 <10
(21) ≥ 10

68. How much trouble do you have getting transporsation to the doctor's office a great deal, some, or hardly at all

hardly	(0)
some	(1)
a great deal	(21)

APPENDIX C

DIABETIC POPULATION ESTIMATE

TABLE 5

ESTIMATE OF DIABETIC POPULATION IN THE HYPOTHETICAL SERVICE AREA

Assumptions:

1. The diabetic population in the USAF Medical Center Wright-Patterson AFB catchment area is similar to the diabetic population in the United States in 1973.

2. The estimated diabetic population meets the criteria for the diabetic sample in the same percentages as those hospitalized.

The National Health Survey in 1973, revealed that the prevalence of Diabetes for all age groups was 20.4 per 1000 persons.[2] This prevalence provides an estimate of 1428 for the catchment population of 70,000.

	S	-	D	-	A	-	IN	-	NOT EL		
Sample proportions	.425		.031		.094		.156		.047		
Estimated population	607	-	19	-	57	-	95	-	29	=	406

Where: S = residing within a 10 mile service area; D = expired in the hospital; A = under age 17; IN = repeat admission; NOT EL = not eligible for care in a military hospital.

APPENDIX D

SURVEY RESPONSE FREQUENCIES

TABLE 6
THE COMPUTER PROGRAM VARIABLES

```
34
VAR1.AGE/VAR2.SEX/VAR3.MARITAL STATUS/
VAR4.ADULTS IN QUARTERS/
VAR5.ADULT RELATIONSHIP/
VAR6.WORK REGULARLY/
VAR7.RETIREMENT/
VAR8.MEDICAL REASONS FOR NOT WORKING/
VAR9.BED CONFINEMENT DAYS LAST TWO WEEKS/
VAR10.ACTIVITY RESTRICTION LAST TWO WEEKS/
VAR11.ACTIVITY RESTRICTION DAYS/
VAR12.BED CONFINEMENT/
VAR13.HOME CONFINEMENT/
VAR14.HOME ASSISTANCE NEEDED/
VAR15.SPECIAL AIDS/
VAR16.TROUBLE GETTING AROUND/
VAR17.WALKING UPSTAIRS/
VAR18.HELPER1/
VAR19.DRESSING/
VAR20.HELPER2/
VAR21.CHANGING BANDAGES/
VAR22.HELPER3/
VAR23.RECEIVING INJECTIONS/
VAR24.HELPER4/
VAR25.RECEIVING MEDICATION/
VAR26.HELPER5/
VAR27.CHANGING BED POSITION/
VAR28.HELPER6/
VAR29.EXERCISING/
VAR30.HELPER7/
VAR31.CUTTING TOENAILS/
VAR32.HELPER8/
VAR33.DEGREE OF HOME SUPERVISION NEEDED/
VAR34.HEALTH WORKER VISITS/
VAR35.NUMBER VISITS LAST YEAR/
VAR36.HEALTH WORKER PAYMENT/
VAR37.METHOD OF PAYMENT/
VAR38.YEARS OF DIABETES/
VAR39.TAKING INSULIN/
VAR40.WHO INJECTS INSULIN/
VAR41.WHO TAUGHT INJECTION/
VAR42.CAUSE OF REACTION/
VAR43.REACTION TREATMENT/
VAR44.TEST URINE FOR SUGAR/
VAR45.TIMES URINE TESTED/
VAR46.WHEN LAST TESTED/
VAR47.RESULTS RECORDED/
VAR48.USE OF RESULTS/
VAR49.WHEN URINE TESTING DONE/
VAR50.WEIGHT/
VAR51.PREPARATION OF MEALS/
VAR52.DIABETIC DIET/
VAR53.WHO TAUGHT DIET/
VAR54.FOLLOW DIET/
VAR55.TAUGHT FOOT CARE/
VAR56.CARE OF FEET/
VAR57.EYE EXAM LAST YEAR/
VAR58.READ NEWSPRINT/
VAR59.SEE ACROSS STREET/
VAR60.VISUAL DIFFICULTY/
VAR61.USUAL PLACE OF CARE/
VAR62.INTERVAL SINCE LAST VISIT/
VAR63.USUAL INTERVAL/
VAR64.SATISFACTION WITH INTERVAL/
VAR65.CALLS FOR MEDICAL ADVICE/
VAR66.APPOINTMENT CALLS/
VAR67.APPOINTMENT NONAVAILABILITY/
VAR68.TRANSPORTATION RELIABILITY
FAMSUP.FAMILY SUPPORT/
DIAKNO.DIABETIC KNOWLEDGE/
DIAMAN.DIABETIC MANAGEMENT/
DISAB.DISABILITIES/
MDAC.MEDICAL ACCESS/
MOB.MOBILITY/
ACTRES.ACTIVITY RESTRICTION/
VIS.VISUAL DISABILITY
```

TABLE 7

CODES FOR SURVEY RESPONSES

```
VAR1 (1)25-62 (2)43-60 (3)61-79/
VAR2 (1) MALE (2) FEMALE/
VAR3 (1) MARRIED (2) WIDOWED (3) DIVORCED
(4)NEVER    MARRIED/
VAR4 (0)MORE     THAN 0 (1) NONE/
VAR5 (1)COMBINATION (2)SPOUSE (3)RELATIVE
(4)OTHER (7)NA/
VAR9.VAR11 (0) NONE (1) 1-4 (2) 5-8 (3) 9-12 (4) 13-14/
VAR6.VAR7.VAR47.VAR52.VAR55.VAR57 TO VAR59 (0) YES
(1) NO/
VAR8.VAR10.VAR12 TO VAR17.VAR19.VAR21.VAR23.VAR25.VAR27,
VAR29.VAR31,VAR34.VAR36.VAR39 (1) YES (0) NO/
VAR18.VAR20.VAR22.VAR24.VAR26.VAR28.VAR30.VAR32

(0) FAMILY   OR NA (1) OTHER (2) NO ONE/
VAR33 (1) ONLYCARE (2)PARTTIME (3)ALL TIME (0) NA/
VAR35 (0)NONE (1)1-5 (2)6-10 (3)MORE     THAN 10/
VAR37 (1)CHAMPUS (2)SELF (3)INSURANCE (4)MEDICARE
(5)MEDICAID (6)OTHER (7)NA/
VAR38 (1)5 AND   LESS (2)6-10 (3) 10 AND  MORE/
VAR40 (0)SELF (1)RELATIVE (2)NURSE (3)OTHER (7)NA/
VAR41 (1)DOCTOR (2)NURSE (3)RELATIVE (4)OTHER
(5)NOT     TAUGHT (7)NA/
VAR42.VAR43,VAR49.VAR56 (0)CORRECT (1)INCORRECT/
VAR44 (0)YES (17)NO/
VAR45 (0) 21 AND  OVER (1)10-20 (4)3-9 (17)LESS THAN 3/
VAR46 (0)30 AND  UNDER (1)MORE THAN 30/
VAR48.VAR54 (0)YES (4)NO/
VAR50 (0)10% AND UNDER (1) LOST (17) NO LOSS/
VAR51 (0)SPOUSE  RELATIVE (1)SELF (2)OTHER/
VAR53 (1)DOCTOR (2)NURSE (3)PATIENT (4)DIETITIAN
(5)OTHER (6)NOT     TAUGHT/
VAR60 (0)HARDLY  AT ALL (1)SOME (2)GREAT   DEAL/
VAR61 (1)WRIGHT-PATTERSON (2)CIVILIAN (3)OTHER/
VAR62 (0)6 WKS   AND LESS (1)MORE    THAN 6/
VAR63 (0)6 AND    LESS (1)7-10 (5)11-15 (21)MORE THAN 15/
VAR64 (0)ADEQUATE (1)SOMEWHAT LONG (21)MUCH TOO LONG/
VAR65 (0)NONE (1)1-9 (5)10-20 (21)21 AND  OVER/
VAR66 (0)6 AND   LESS (1)7-12  (5) 13-18
(21)MORE    THAN 18/
VAR67 (0)NONE (1)1-4 (5)5-9 (21)10 AND  OVER/

DIAKNO (0)ALL     CORRECT (1)2       CORRECT
(4)1       CORRECT (17)NONE/
FAMSUP (1)HIGH    SUPPORT (2)LOW     SUPPORT/
DIAMAN,MDAC (1)EXCELLENT (2)GOOD AND FAIR (3) POOR/
DISAB (1)NO DISABILITY (2) DISABILITY/
MOB (1)NO DISABILITY (2)DISABILITY/
ACTRES (1)NO DISABILITY (2)DISABILITY/
VIS (1)NO DISABILITY (2) DISABILITY
```

TABLE 8

RAW FREQUENCIES

	CODED RESPONSES									
Variable	0	1	2	3	4	5	6	7	17	21
1		3	22	9						
2		19	15							
3		27	4	2						
4	31	3								
5		17	12	3	2					
6	26	8								
7	6	28								
8	22	12								
9	31	1	2							
10	26	8								
11	26	5	1	2						
12	34									
13	28	6								
14	32	2								
15	29	5								
16	28	6								
17	33	1								
18		33	1							
19	32	2								
20	34									
21	34									
22	34									
23	31	3								
24	33	1								
25	30	4								
26	33		1							
27	34									
28	34									
29	33	1								
30	33		1							
31	30	4								
32	32	2								
33	26	5	3							
34	31	3								
35	33			1						
36	34									
37	34									
38		15	7	12						
39	12	22								
40	20	2	12							
41		3	15	2	1	13				
42	26	8								
43	33	1								
44	30								4	

TABLE 8 (Continued)

		CODED RESPONSES								
Variable	0	1	2	3	4	5	6	7	17	21
45	30	1							3	
46	30	4								
47	21	13								
48	30				4					
49	30	4								
50	23	8							3	
51	18	12	4							
52	34									
53		1			33					
54	27				7					
55	32	2								
56	31	3								
57	28	6								
58	29	5								
59	31	3								
60	23	8	3							
61		34								
62	17	17								
Controlled 63	32									2
Uncontrolled 63	8	4				1				21
64	32	2								
65	29	5								
66	29	4				1				
67	25	9								
68	28	3								3
Uncontrolled 45	5	15			2				12	
DIAKNO	0	7			3					

	GROUPS			
	1	2	3	4
DIAMAN	13	7	5	9
DIAMAN Combined	13	12	9	
MDAC	18	11	1	4
	1	2	3	4
MDAC Combined	18	12	4	
Uncontrolled DIAMAN	3	8	1	21
Uncontrolled	1	12	6	15
DISAB	15	9		
MOB	24	10		
VIS	23	11		
ACT RES	18	16		

APPENDIX E

CHI SQUARE EVALUATION OF THE MAJOR TEST VARIABLES

TABLE 9

DISABILITY BY DIABETIC MANAGEMENT

DISAB	DIAMAN: 1. EXCELLENT	2. GOOD AND FAIR	3. POOR	ROW TOTAL
1. NO DISABILITY	8	2	3	13
	61.5	15.4	23.1	38.2
	61.5	16.7	33.3	
	23.5	5.9	8.8	
2. DISABILITY	5	10	6	21
	23.8	47.6	28.6	61.8
	38.5	83.3	66.7	
	14.7	29.4	17.6	
COLUMN TOTAL	13	12	9	34
	38.2	35.3	26.5	100.0

CHI SQUARE = 5.44473 WITH 2 DEGREES OF FREEDOM SIGNIFICANCE = 0.0657

TABLE 10

DISABILITY BY MEDICAL ACCESS

DISAB	MDAC: 1. EXCELLENT	2. GOOD AND FAIR	3. POOR	ROW TOTAL
1. NO DISABILITY	9	3	1	13
	69.2	23.1	7.7	38.2
	50.0	25.0	25.0	
	26.5	8.8	2.9	
2. DISABILITY	9	9	3	21
	42.9	42.9	14.3	61.8
	50.0	75.0	75.0	
	26.5	26.5	8.8	
COLUMN TOTAL	18	12	4	34
	52.9	35.3	11.8	100.0

CHI SQUARE = 2.24176 WITH 2 DEGREES OF FREEDOM SIGNIFICANCE = 0.3266

TABLE 11

FAMILY SUPPORT BY DIABETIC MANAGEMENT

FAMSUP		DIAMAN 1. EXCELLEN	2. GOOD AND FAIR	3. POOR	ROW TOTAL
1. HIGH SUPPORT	COUNT	13	11	6	30
	ROW PCT	43.3	36.7	20.0	88.2
	COL PCT	100.0	91.7	66.7	
	TOT PCT	38.2	32.4	17.6	
2. LOW SUPPORT	COUNT	0	1	3	4
	ROW PCT	0.	25.	75.0	11.8
	COL PCT	0.	8.3	33.3	
	TOT PCT	0.	2.9	8.8	
COLUMN TOTAL		13	12	9	34
		38.2	35.3	26.5	100.0

CHI SQUARE = 5.92728 WITH 2 DEGREES OF FREEDOM SIGNIFICANCE = 0.0523

TABLE 12

FAMILY SUPPORT BY MEDICAL ACCESS

FAMSUP		MDAC 1. EXCELLEN	2. GOOD AND FAIR	3. POOR	ROW TOTAL
1. HIGH SUPPORT	COUNT	17	10	3	30
	ROW PCT	56.7	33.3	10.0	88.2
	COL PCT	94.4	83.3	75.0	
	TOT PCT	50.0	29.4	8.8	
2. LOW SUPPORT	COUNT	1	2	1	4
	ROW PCT	25.0	50.0	25.0	11.8
	COL PCT	5.6	16.7	25.0	
	TOT PCT	2.9	5.9	2.9	
COLUMN TOTAL		18	12	4	34
		52.9	35.3	11.8	100.0

CHI SQUARE = 1.62150 WITH 2 DEGREES OF FREEDOM SIGNIFICANCE = 0.4446

TABLE 13

DISABILITY BY FAMILY SUPPORT

DISAB	FAMSUP 1. HIGH SUPPORT	2. LOW SUPPORT	ROW TOTAL
1. NO DISABILITY	13	0	13
	100.0	0.0	38.2
	43.3	0.0	
	38.2	0.0	
2. DISABILITY	17	4	21
	81.0	19.0	61.8
	56.7	100.0	
	50.0	11.8	
COLUMN TOTAL	30	4	34
	88.2	11.8	100.0

CORRECTED CHI SQUARE = 1.27137

WITH 1 DEGREE OF FREEDOM SIGNIFICANCE = 0.2595

TABLE 14

DIABETIC MANAGEMENT BY MEDICAL ACCESS

DIAMAN	MDAC 1. EXCELLEN	2. GOOD AND FAIR	3. POOR	ROW TOTAL
1. EXCELLENT	8	4	1	13
	61.5	30.8	7.7	38.2
	44.4	33.3	25.0	
	23.5	11.8	2.9	
2. GOOD AND FAIR	7	4	1	12
	58.3	33.3	8.3	35.3
	38.9	33.3	25.0	
	20.6	11.8	2.9	
3. POOR	3	4	2	9
	33.3	44.4	22.2	26.5
	16.7	33.3	50.0	
	8.8	11.8	5.9	
COLUMN TOTAL	18	12	4	34
	52.9	35.3	11.8	100.0

CHI SQUARE = 2.34295 WITH 4 DEGREES OF FREEDOM SIGNIFICANCE = 0.673

APPENDIX F

T-TEST OF SELECTED VARIABLES

APPENDIX F

T-TEST OF THE DIFFERENCE BETWEEN MEANS

#	Variable Test	Method of Measurement	n	$\bar{x}$	s^2	F	Critical F	t	Critical t/z	Ho
1	Family Support and Diabetic Management	Diabetic Management Scores for high and low family support	4 30	21.75 5.03	214.92 66.38	3.23	2.93	2.23	1.64	Reject
2	Disability (Original) and Diabetic Management	Diabetic Management Scores for Disabled and Nondisabled	21 13	8.5 3.8	133.86 50 3	2.66	2.54	1.46	1.64	Accept
3	Mobility and Visual Disability	Mobility Scores for Visually Disabled and Nondisabled	11 23	3. .65	14.6 2.78	10.46	2.77	1.95	1.64	Reject
4	Mobility and Activity Restriction	Activity Restriction Scores for Mobility Disabled and Non Disabled	10 24	2.9 .58	11.21 1.04	10.78	2.32	2.15	1.64	Reject
5	Visual disability and Activity Restriction	Activity Restriction Scores for Visually Disabled and Non Disabled	23 11	1.3 1.2	6.68 1.56	4.28	2.77	.152	1.64	Accept
6	Mobility and Visual Disability by Activity Restriction	Activity Restriction Scores for Mobility and Visually Disabled and Non Disabled	15 19	2.13 .58	8.98 .92	9.76	2.20	1.92	1.64	Reject
7	Activity Restriction and Diabetic Management	Diabetic Management Scores for Those with and without Activity Restriction	16 18	8.81 4.44	148.02 82.55	1.79	2.72	1.19	1.64	Accept

APPENDIX F

T-TEST OF THE DIFFERENCE BETWEEN MEANS (Cont'd)

#	Variable Test	Method of Measurement	n	$\bar{x}$	s^2	F	Critical F	t	Critical t/z	Ho
8	Family Support and Disability (Original)	Disability Scores for High and Low Family Support	4 30	8.5 2.6	49.7 16.5	3.01	2.93	1.637	1.64	Accept
9	Family Support and Disability (Revised)	Disability Scores for High and Low Family Support	4 30	8.5 1.8	49.7 5.32	3.01	2.93	1.637	1.64	Accept
10	Controlled Medical Access and Revised Disability	Medical Access Scores for Disabled and Non Disabled	15 19	6.4 1.9	155.26 28.27	5.44	2.29	1.3	1.64	Accept
11	Uncontrolled Medical Access and Revised Disability	Medical Access Scores for Disabled and Non Disabled	15 19	19.26 13.2	171.2 116.6	1.47	2.29	1.45	1.64	Accept
12	Disability and Diabetic Management Controlling for Family Support	Diabetic Management Scores for Disabled and Non Disabled with High Family Support	12 18	7.4 3.4	89.7 48.5	1.85	2.45	1.39	1.697	Accept
13	Transportation Reliability and Family Support	Transportation Reliability Scores for High and Low Support	4 30	5.5 1.5	107. 28.25	3.78	2.93	.76	1.64	Accept
14	Family Support and Diabetic Management Controlling for Disability	Diabetic Management Scores for the Disabled with High and Low Family Support	3 12	27.7 7.4	112.3 39.7	1.25	3.59	3.27	1.771	Reject
15	Age and Disability	Ages of the Disabled and Nondisabled	19 15	50.1 57.2	135.61 103.31	1.31	2.29	-1.865	-1.64	Reject

APPENDIX F

T-TEST OF THE DIFFERENCE BETWEEN MEANS (Cont'd)

#	Variable Test	Method of Measurement	n	$\bar{x}$	s^2	F	Critical F	t	Critical t/z	Ho
16	Insulin and Diabetic Management	Diabetic Scores for Insulin Use and Non-use	22 12	5.4 10.	107.7 102.6	1.05	2.32	-1.21	-1.64	Accept
17	Insulin and Disability	Insulin Scores for Disabled and Non-disabled	15 19	.47 .78	.27 .18	1.54	2.27	-1.92	-1.64	Reject
18	Disability and Diabetic Management Controlled for Insulin Use	Diabetic Management Scores for Disabled and Nondisabled Who Use Insulin	17 15	13.1 10	227.1 110.7	2.1	2.85	.57	1.725	Accept
19	Disability and Diabetic Management Controlled for Insulin Nonuse	Diabetic Management Scores for Disabled and Nondisabled Who Do Not Use Insulin	8 4	10. 10.	113.7 110.7	1.02	6.09	0	--	Accept
20	Insulin and Family Support	Insulin Scores for High and Low Family Support	4	.75	.25	1.04	2.93	1.69	1.64	Accept
21	Family Support and Diabetic Management Controlled for Insulin Use	Diabetic Management Scores for High and Low Family Support Who Use Insulin	3 19	20.3 3.	310.33 47.9	6.48	3.55	1.68	1.64	Reject

APPENDIX G

DISABILITY AND DIEBETIC MANAGEMENT AND FAMILY SUPPORT EVALUATIONS

TABLE 16

REVISED DISABILITY AND DIABETIC MANAGEMENT

(VALID EXPECTED FREQUENCIES)

		DISAB		
	COUNT / ROW PCT / COL PCT / TOT PCT	1. NO DISABILITY	2. DISABILITY	ROW TOTAL
DIAMAN				
1. EXCELLENT		11	2	13
		84.6	15.4	38.2
		57.9	13.3	
		32.4	5.9	
2. GOOD AND FAIR		5	7	12
		41.7	58.3	35.3
		26.3	46.7	
		14.7	20.6	
3. POOR		3	6	9
		33.3	66.7	26.5
		15.8	40.0	
		8.8	17.6	
COLUMN TOTAL		19	15	34
		55.9	44.1	100.0

CHI SQUARE = 7.19307 WITH 2 DEGREES OF FREEDOM SIGNIFICANCE = 0.0274

TABLE 17

REVISED DISABILITY AND FAMILY SUPPORT

FAMSUP		DISAB 1. NO DISABILITY	DISAB 2. DISABILITY	ROW TOTAL
1. HIGH	SUPPORT	18	12	30
		60.0	40.0	88.2
		94.7	80.0	
		52.9	35.3	
2. LOW	SUPPORT	1	3	4
		25.0	75.0	11.8
		5.3	20.0	
		2.9	8.8	
COLUMN TOTAL		19	15	34
		55.9	44.1	100.0

SIGNIFICANCE = 0.4905

CORRECTED CHI SQUARE = 0.68135 WITH 1 DEGREE OF FREEDOM

Invalid expected frequencies; see Appendix F for t-test).

TABLE 18

DISABILITY AND DIABETIC MANAGEMENT

CONTROLLING FOR FAMILY SUPPORT

DISAB

DIAMAN		NO DISABILITY (1.)	DISABILITY (2.)	ROW TOTAL
1. EXCELLENT	COUNT	11	2	13
	ROW PCT	84.6	15.4	43.3
	COL PCT	61.1	16.7	
	TOT PCT	36.7	6.7	
2. GOOD AND FAIR	COUNT	4	7	11
	ROW PCT	36.4	63.6	36.7
	COL PCT	22.2	58.3	
	TOT PCT	13.3	23.3	
3. POOR	COUNT	3	3	6
	ROW PCT	50.0	50.0	20.0
	COL PCT	16.7	25.0	
	TOT PCT	10.0	10.0	
COLUMN TOTAL		18	12	30
		60.0	40.0	100.0

DISAB

DIAMAN		NO DISABILITY (1.)	DISABILITY (2.)	ROW TOTAL
2. GOOD AND FAIR	COUNT	1	0	1
	ROW PCT	100.0	0.	25.0
	COL PCT	100.0	0.	
	TOT PCT	25.0	0.	
3. POOR	COUNT	0	3	3
	ROW PCT	0.	100.0	75.0
	COL PCT	0.	100.0	
	TOT PCT	0.	75.0	
COLUMN TOTAL		1	3	4
		25.0	75.0	100.0

Invalid expected frequencies; see Appendix F for t-test.

APPENDIX H

TRANSPORTATION RELIABILITY EVALUATIONS

TABLE 19

MEDICAL ACCESS BY SATISFACTION
WITH THE INTERVAL BETWEEN PHYSICIANS VISITS

		MDAC			
	COUNT / ROW PCT / COL PCT / TOT PCT	1. EXCELLEN	2. GOOD AND FAIR	3. POOR	ROW TOTAL
VAR54					
0. ADEQUATE		18	12	2	32
		56.3	37.5	6.3	94.1
		100.0	100.0	50.0	
		52.9	35.3	5.9	
1. SOMEWHAT LONG		0	0	2	2
		0.	0.	100.0	5.9
		0.	0.	50.0	
		0.	0.	5.9	
COLUMN TOTAL		18	12	4	34
		52.9	35.3	11.8	100.0

TABLE 20

MEDICAL ACCESS AND RELIABILITY
OF TRANSPORTATION

	MDAC			
COUNT / ROW PCT / COL PCT / TOT PCT	EXCELLEN 4.	GOOD AND FAIR 2.	POOR 3.	ROW TOTAL
VAR68				
0. HARDLY AT ALL	18	9	1	28
	64.3	32.1	3.6	82.4
	100.0	75.0	25.0	
	52.9	26.5	2.9	
1. SOME	0	3	0	3
	0.	100.0	0.	8.8
	0.	25.0	0.	
	0.	8.8	0.	
21. GREAT DEAL	0	0	3	3
	0.	0.	100.0	8.8
	0.	0.	75.0	
	0.	0.	8.8	
COLUMN TOTAL	18	12	4	34
	52.9	35.3	11.8	100.0

CHI SQUARE = 30.35714 WITH 4 DEGREES OF FREEDOM

SIGNIFICANCE = 0.0000

TABLE 21

DISABILITY AND TRANSPORTATION RELIABILITY

		VAR68						
	COUNT ROW PCT COL PCT TOT PCT	HARDLY AT ALL		SOME		GREAT DEAL		ROW TOTAL
		0.		1.		2.		
DISAB								
1. NO DISABILITY		19 100.0 67.9 55.9		0 0. 0. 0.		0 0. 0. 0.		19 55.9
2. DISABILITY		9 60.0 32.1 26.5		3 20.0 100.0 8.8		3 20.0 100.0 8.8		15 44.1
COLUMN TOTAL		28 82.4		3 8.8		3 8.8		34 100.0

CHI SQUARE = 9.22857 WITH 2 DEGREES OF FREEDOM

SIGNIFICANCE = 0.0099

Invalid Expected Frequencies, See Table 21 for ANOVA.

TABLE 22

FAMILY SUPPORT AND TRANSPORTATION RELIABILITY

		VAR68						
	COUNT / ROW PCT / COL PCT / TOT PCT	HARDLY AT ALL (0.)		SOME (1.)		GREAT DEAL (2.)		ROW TOTAL
FAMSUP								
1. HIGH SUPPORT		26		2		2		30
		86.7		6.7		6.7		88.2
		92.9		66.7		66.7		
		76.5		5.9		5.9		
2. LOW SUPPORT		2		1		1		4
		50.0		25.0		25.0		11.8
		7.1		33.3		33.3		
		5.9		2.9		2.9		
COLUMN TOTAL		28		3		3		34
		82.4		8.8		8.8		100.0

Invalid Expected Frequencies; See Appendix F for t-test.

TABLE 23

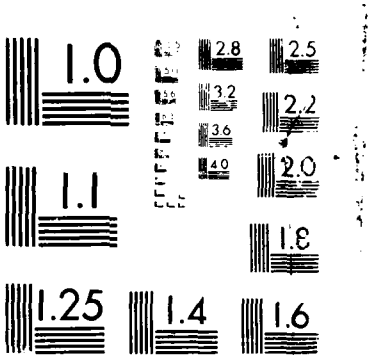
DIABETIC MANAGEMENT AND TRANSPORTATION RELIABILITY

	VAR68			
	COUNT / ROW PCT / COL PCT / TOT PCT	HARDLY AT ALL (0.)	SOME (1.)	GREAT DEAL (2.)	ROW TOTAL
DIAMAN					
1. EXCELLENT		13	0	0	13
		100.0	0.	0.	38.2
		46.4	0.	0.	
		38.2	0.	0.	
2. GOOD AND FAIR		10	1	1	12
		83.3	8.3	8.3	35.3
		35.7	33.3	33.3	
		29.4	2.9	2.9	
3. POOR		5	2	2	9
		55.6	22.2	22.2	26.5
		17.9	66.7	66.7	
		14.7	5.9	5.9	
COLUMN TOTAL		28	3	3	34
		82.4	8.8	8.8	100.0

Invalid Expected Frequencies; See Table 24 for ANOVA.

AD-A195 190 A STUDY TO DETERMINE THE NEED FOR HOME HEALTH CARE FOR PATIENTS DIAGNOSED..(U) ARMY HEALTH CARE STUDIES AND CLINICAL INVESTIGATION ACTIVITY F.. P L WILLIAMS 2/2

UNCLASSIFIED AUG 79 HCSIA-27-80 F/G 6/5 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963

TABLE 24

ANALYSIS OF VARIANCE (ANOVA) FOR TRANSPORTATION RELIABILITY WITH DISABILITY AND WITH DIABETIC MANAGEMENT

Ho: $\mu_1 = \mu_2 = \mu_3$ $\alpha = .05$ Critical $F_{.05,2,31} = 3.32$

Ha: Not all the μs are equal

Transportation reliability and disability

Method of measurement: Disability scores for no difficulty, some difficulty and a great deal of difficulty.

Variation	df	Sum of squares	Mean square	F	
Between	2	111.51	55.76	5.29	
Within	31	326.37	10.53		Reject Ho
Total	33	437.88			

Transportation reliability and diabetic management

Method of measurement: Diabetic management scores for no difficulty, some difficulty and a great deal of difficulty.

Variation	df	Sum of squares	Mean square	F	
Between	2	1402.3	701.2	10.1	
Within	31	2153.7	69.5		Reject Ho
Total	33	3556			

APPENDIX I

INSULIN CROSS TABULATIONS

TABLE 25

CHI SQUARE EVALUATION OF INSULIN AND DIABETIC MANAGEMENT;
CROSS TABULATION DISABILITY AND INSULIN

DISAB

COUNT / ROW PCT / COL PCT / TOT PCT	1. NO DISABILITY	2. DISABILITY	ROW TOTAL
VAR39			
0. NO	4	8	12
	33.3	66.7	35.3
	21.1	53.3	
	11.8	23.5	
1. YES	15	7	22
	68.2	31.8	64.7
	78.9	46.7	
	44.1	20.6	
COLUMN TOTAL	19	15	34
	55.9	44.1	100.0

DIAMAN

COUNT / ROW PCT / COL PCT / TOT PCT	1. EXCELLENT	2. GOOD AND FAIR	3. POOR	ROW TOTAL
VAR39				
0. NO	1	6	5	12
	8.3	50.0	41.7	35.3
	7.7	50.0	55.6	
	2.9	17.6	14.7	
1. YES	12	6	4	22
	54.5	27.3	18.2	64.7
	92.3	50.0	44.4	
	35.3	17.6	11.8	
COLUMN TOTAL	13	12	9	34
	38.2	35.3	26.5	100.0

CHI SQUARE = 7.0914 WITH 2 DEGREES OF FREEDOM

SIGNIFICANCE = 0.0289

TABLE 26

CHI SQUARE EVALUATION OF DIABETIC MANAGEMENT AND DISABILITY CONTROLLED FOR THE USE AND NONUSE OF INSULIN

DISAB

COUNT / ROW PCT / COL PCT / TOT PCT	NO DISABILITY (1.)	DISABILITY (2.)	ROW TOTAL
DIAMAN			
1. EXCELLENT	11	1	12
	91.7	8.3	54.5
	73.3	14.3	
	50.0	4.5	
2. GOOD AND FAIR	3	3	6
	50.0	50.0	27.3
	20.0	42.9	
	13.6	13.6	
3. POOR	1	3	4
	25.0	75.0	18.2
	6.7	42.9	
	4.5	13.6	
COLUMN TOTAL	15	7	22
	68.2	31.8	100.0

CHI SQUARE = 7.40317 WITH 2 DEGREES OF FREEDOM SIGNIFICANCE = 0.0247

DISAB

COUNT / ROW PCT / COL PCT / TOT PCT	NO DISABILITY (1.)	DISABILITY (2.)	ROW TOTAL
DIAMAN			
1. EXCELLENT	0	1	1
	0.	100.0	8.3
	0.	12.5	
	0.	8.3	
2. GOOD AND FAIR	2	4	6
	33.3	66.7	50.0
	50.0	50.0	
	16.7	33.3	
3. POOR	2	3	5
	40.0	60.0	41.7
	50.0	37.5	
	16.7	25.0	
COLUMN TOTAL	4	8	12
	33.3	66.7	100.0

CHI SQUARE = 0.60000 WITH 2 DEGREES OF FREEDOM SIGNIFICANCE = 0.7408

APPENDIX J

COMPARISON OF POPULATION PROPORTIONS

TABLE 27

COMPARISON OF POPULATION PROPORTIONS

BETWEEN THE DIABETIC SAMPLE AND OTHER STUDIES

Study Proportion	Hypothesis	Diabetic Sample	$\tilde{p}_1 - \tilde{p}_2$	Variance of $\tilde{p}_1 - \tilde{p}_2$		Ho
Hart 5.2% n = 732	$P_1 - P_2 \leq .05$ $P_1 - P_2 > .05$	n = 34	.103	.0697	1.47	Accept
	$P_1 - P_2 \leq 0$ $P_1 - P_2 > 0$	n = 59	.066	.04279		Accept
HHCS Studies average 6%	$P_1 - P_2 \leq .05$ $P_1 - P_2 > .05$	n = 34	.095	.06026	1.53	Accept
	$P_1 - P_2 \leq 0$ $P_1 - P_2 > 0$	n = 59	.058	.042	1.38	Accept

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